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# ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING, INCLUDING INDEX TO GEOPHYSICAL ABSTRACTS NOS. 45 TO 56

Compiled by Frederick W. Lee

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## 1. GRAVITATIONAL METHODS

### (1721) TILTING DUE TO GLACIAL MELTING

By B. Gutenburg

Journal of Geology, vol. 41, no. 5, 1933, pp. 449-467.

To investigate tilting and changes in level in the United States and Canada, results from the records of tide gages of different stations were analyzed. In the Great Lakes region all results indicate a tilting of the land upward in a northerly direction, by about 10 cm per 100 km per century. Along the Pacific coast a small rising of the land is indicated at the north, whereas in California the changes in height seem to be negative, but small and irregular. Along the Atlantic coast of Canada the changes are small and within the limits of error nearly everywhere, but south of Portland, Me., sinking prevails clearly. It is very probable that the tilt in the Great Lakes region is due to forces which tend to restore isostatic equilibrium, disturbed by the melting of ice after the ice age.--Author's abstract.

## 2. MAGNETIC METHODS

### (1722) DISTRIBUTION OF MAGNETIC ELEMENTS AND OF THEIR ANNUAL CHANGES IN THE VICINITY OF THE MAGNETIC POLES

By B. P. Weinberg

Journal of Geophysics, Moscow, vol. 2, no. 3/4, 1932, pp. 342-346.

Values of Z, H, and I and of their gradients are calculated under the assumption of a uniformly magnetized globe. Isolines of Z, H, and I around the north magnetic pole are given in diagrams.--W. Ayvazoglou.

### (1723) FAR EAST RAND AREAS ("A") CO., LTD.

EDITORIAL NOTE

Rhodesian Mining Journal, Johannesburg, vol. 7, no. 76, 1933, pp. 397-398.

In discussing the progress made in proving the extension of Witwatersrand beds in Bethol district, J. F. Kapnek, chairman of the above company mentioned the results of magnetometric investigations made to determine the character of the anomalies obtained from the strata in the East Rand Basin and for comparison with those that will be met with in the Far East Rand Area Basin. Observations were made at about 3,700 survey stations. In connection with the preliminary boreholes in suitable localities, the data obtained from geophysical observations should be enough to determine where the main drilling program should be carried out in the future.--W. Ayvazoglou.

## (1724) A MAGNETIC SURVEY IN THE VICINITY OF A GRANITE BATHYLITE

By Edgar Booth and J. M. Rayner

Journal and Proceedings of the Royal Society of New South Wales, Sydney, vol. 67, Sept. 21, 1933, pp. 117-131.

This paper deals with a large-scale magnetic survey near Gulgong and Home Rule, covering portions of the Parishes of Gulgong and Wyaldra, County Phillip, and of Parish Stubbo, County Bligh, New South Wales (a map showing lines of equal magnetic vertical intensities is added). The area covered is about 80 square miles, and observations were taken at about 530 different stations.

In this survey a portion of the magnetic field due to a large granitic mass has been investigated. Specimens of the granite were examined and found to have susceptibilities ranging from 1,000 x $10^{-6}$ to 1,200 x $10^{-6}$ c.g.s. units. In computing a magnetic profile for a hypothetical section for comparison with the profiles actually obtained, it was found necessary, however, to assume a susceptibility for the granite of approximately 2,000 x $10^{-6}$ c.g.s. units. A magnetic anomaly of considerable magnitude has been located.

Two vertical field balances were in use, both of the Adolf Schmidt type, constructed by the Askania-Werke Co.

The survey demonstrates how powerful a weapon is the magnetic method in determining the position of the contact between two rock types when it is obscured by superficial deposits, even of considerable thickness.--W. Ayvazoglou.

## (1725) THE EFFECT OF A SOLAR ECLIPSE IN THE EARTH'S MAGNETIC FIELD

By S. Chapman

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 38, no. 3, 1933, pp. 175-183.

The reduction of ionization in the E-layer at a point on the track of the total eclipse of August 31, 1932, has been measured by Henderson; the effect of this on electron currents flowing in the layer is here examined, and the corresponding magnetic effects are inferred. If this layer is the seat of the currents which produce the solar diurnal magnetic variation (S), the magnetic effects of an eclipse should, it is inferred, be apparent, and their nature is described. If, however, (S) is produced in the upper (F) ionized layer, the eclipse effects are likely to be too small for certain detection. The magnetic observations during eclipses are discussed, and the opinion is expressed that they show no regular magnetic effect of the type here predicted and that therefore (S) probably is not produced in the E-layer; but a final decision must await further observations.--Author's abstract.

# (1726) DIE GEOLOGIE DES GEBIETES ZWISCHEN SAALE UND ELBE IM LICHTE ERDMAGNETISCHER MESSUNGEN

## (THE GEOLOGY OF THE REGION BETWEEN THE SAALE AND THE ELBE FROM THE VIEWPOINT OF EARTH MAGNETIC MEASUREMENTS)

By Erich Bein

Beiträge zur physikalischen Erforschung der Erdrinde, Heft 6, 1933, pp. 13-69. Issued by the Preussische geologische Landesanstalt, Berlin.

Contents:

1. Introduction.
2. Instrumental - physical part: (a) Execution of measurements. (b) Mathematical treatment of the results of measurements.
3. Geological-physical part: (a) Geology of the region under investigation. (b) Interpretation of the magnetic survey (the general magnetic picture; anomalies on the Saale near Wettin and on the Elbe near Dessau - Oranienbaum; the anomaly between Leipzig and Delitzsch; the anomalies near Halle and Eilenburg; the anomaly near Bockwitz; the effect produced by the sediment). (c) The regional-geological importance of the magnetic survey.

The main results of the magnetic survey are summed up by the author and may be rendered briefly as follows:

1. The zone of the crystalline primitive rocks was established and traced from the Saale between Wettin and Rothenburg to the Elbe, between Dessau and Oranienbaum. The structure of the subsoil of the zone could be estimated.

2. The region of the positive values of disturbance to the north of Leipzig was determined.

3. The center of the eruption of the porphyries north of Halle was determined. The northern limit of this center was established. The northern branches of the Saxonian porphyries were shown to have a much greater extension than previously expected.

4. It was established that the anomaly in the southeastern part of the region must be attributed to the effect of the rocks belonging to the border zone of the Meissner granite-syenite masses.

5. Owing to the strong anomalies the effect caused by the sediments in the region under investigation was to a great degree concealed. The influence of the diluvial formation could not be established.

A list of selected literature and tables of the magnetic Z-variometer measurements are added.--W. Ayvazoglou.

## (1727) MAGNETISCHE MESSUNGEN IN OSTHARZ UND IN SEINER WEITEREN UMGEBUNG

## (MAGNETIC MEASUREMENTS IN THE EAST HARZ AND ITS MORE DISTANT SURROUNDING COUNTRY)

By Wilhelm Wolff

Beiträge zur geophysikalischen Erforschung der Erdrinde, Heft 5, 1931, 43 pp. Issued by the Preussische Geologische Landesanstalt, Berlin.

The main results of the magnetic survey of the Ostharz and its more distant surrounding country are summarized as follows:

1. Far-extending parallelism of g and z; thus the dependance of the magnetic values of disturbance from the geological structures at great depths was established. The center of the disturbance by which the gravity-maximum near Querfurt was caused could be determined more accurately by means of the magnetic survey, and more information on its development could be obtained.

2. The course of the IIIa Kossmat crystalline zone was found and determined exactly from the Kyffhäuser Mountains to the Saale. It was established that this zone was narrowed between Langensalza and Dessau. According to the magnetic picture it became necessary to subdivide the crystalline zone into the "main zone" and the "antezone".

3. Of all the Paleozoic sediments the Permian Carboniferous ones were especially weak magnetically; for example, negative anomalies were observed at the Hettstedter Brücke and the Hornburger Sattel, and in the Selke Valley. H. Reich's hypothesis on the negative anomalies above Permian Carbons was not confirmed on the Bottendorf and Kyffhäuser mountain ranges; this was caused by the magnetically strong subsoil by which the magnetic influence of the sediments in question was predominated.

4. The Mesozoic layers were established magnetically only to a small extent. The Jurassic layers, chalk layers and shell-limestone layers, were, it seems, less magnetically in comparison with the surrounding layers.

5. The Harz as a whole did not occupy a special rank in the magnetic picture. The anomalies measured probably were caused by the changeable development of the adjoining rocks or of the rocks lying at shallow depths.--Author's abstract, translated by W. Ayvazoglou.

## (1728) WEST WITWATERSRAND AREAS, LTD.

### EDITORIAL NOTE

Mining and Industrial Magazine, Johannesburg,
vol. 17, no. 4, 1933, p. 133.

An intensive investigation of the entire area by magnetometric and geological survey methods has been continued, the policy being to link the information gained from systematic magnetometric traverses with the geological deductions step by step to define as closely as possible the position of the suboutcrop of the Main Reef series under the dolomite cover. Detailed magnetometric traversing served also to define major faulting, thus insuring the location of borehole sites. Since the commencement of operations in December 1930, Dr. Krahmann and his staff have carried out 490 miles of magnetometric traverse, entailing observations at more than 30,000 points.

The mapping completed so far indicates, according to this note, close agreement with the information gained from the geological and magnetometric surveys in respect to location of dykes, while valuable indications have also been obtained in regard to the position of major faults under the dolomite.--W. Ayvazoglou.

## (1729) BEMERKUNG ZU A. SCHEDLER: ZUSAMMENFASSENDE BEARBEITUNG UND DARSTELLUNG DER MAGNETISCHEN DEKLINATION IN OSTERREICH, BÖHMEN, UND MÄHREN-SCHLESIEN ZUR EPOCHE 1930.0.

(REMARK TO A. SCHEDLER'S COMPREHENSIVE ELABORATION AND REPRESENTATION OF THE MAGNETIC DECLINATION IN AUSTRIA, BOHEMIA AND MORAVIA-SILESIA FOR THE EPOCH 1930.0)

By V. Láska

Beiträge zur angewandten Geophysik (formerly Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik) vol. 3, no. 4, 1933, pp. 526-530.

Remarks concerning the fundamental principles of the magnetic cartography are made in connection with A. Schedler's article published in the Ergänzungs-hefte für angewandte Geophysik, vol. 3, no. 2, 1933, pp. 205-210. (See Geophys. Abs. 49, p. 809.)--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1730 ABSORPTION OF SEISMIC AND ACOUSTIC WAVES AND ITS DEPENDENCE ON FREQUENCY (IN RUSSIAN)

By B. Derjagin

Journal of Geophysics, Moscow, vol. 2, no. 3/4, 1933, pp. 337-341.

In a previous article (see Geophys. Abs. 50, pp. 839-840), the author developed the theory of the distribution of elastic waves in solid bodies, taking into consideration the elastic aftereffect. In this article the author examines the damping of the oscillations in case of frequencies changing from one to 40,000 Hertz. The following conclusions are drawn:

1. The theory of the distribution of the elastic waves shows the dependence of the damping from the frequency up to that equal to 40,000 Hertz.

2. At intervals of frequencies between 1 and 40,000 Hertz, the damping of the waves changes very little, the oscillations decreasing from one-half to one-tenth of original values.

3. In acoustic prospecting it is more suitable to use sounds of low frequency.--W. Ayvazoglou.

### (1731) THE FOUNDATIONS OF EARTH-STRUCTURE THEORY

By Ernest A. Hodgson

Journal of the Royal Astronomical Society of Canada, Toronto, vol. 27, no. 1, 1933, pp. 1-10.

The author discusses methods for determining the structure of the earth by using seismic data.--W. Ayvazoglou.

### (1732) THE CHARACTERISTICS OF A DEEP-FOCUS EARTHQUAKE: A STUDY OF THE DISTURBANCE OF FEBRUARY 20, 1931

By F. J. Scrase

Philosophical Transactions of the Royal Society of London, series A, vol. 231, March 1933, pp. 207-234.

In a previous paper (Proc. Roy. Soc., ser. A, vol. 132, 1932, p. 213; see Geophys. Abs. 36, p. 422) the author had indicated that seismograph records of a deep-focus earthquake should show certain characteristic features. To confirm the existence of these features a detailed study has been made of the records, from a large number of stations, of an earthquake near Vladivostok February 20, 1931. Preliminary examination of the Kew seismograms had shown that the disturbance originated at a great focal depth.

When an earthquake focus is abnormally deep, phases additional to those associated with normal earthquakes are produced by reflections at points comparatively near the epicenter; these echoes arrive soon after the direct waves. Further, the surface waves are developed feebly, and a much greater proportion of energy is carried by the body waves than in normal shocks; on this account, the preliminary phases are comparatively prominent.

Most of the records examined show these characteristics remarkably well. The singly reflected echoes are especially well-developed, and the time intervals between these and the direct waves provide reliable data for the computation of the depth of focus when the velocities in the upper layers are known. The focal depth has been estimated as 360 km below the earth's surface.

The time-distance observations of the phases have been compared with the calculated curves based on the Zöppritz-Turner tables of the times of transmission of longitudinal and transverse waves; most of the discrepancies are explained by the errors known to exist in these tables. When allowance is made for the abnormal depth of focus, the observed times of travel of the direct waves are in much better agreement with Jeffreys' revised tables, but at distances greater than 85° Jeffreys' times for transverse waves appear to be too great.

The surface waves are very difficult to recognize in most of the records and there is no trace at all of very long Love waves.--Author's abstract.

## (1733) ANALYSIS OF SEISMIC PROFILES

By Irwin Roman

American Institute of Mining and Metallurgical Engineers, New York,
Contribution 64, November 1933, pp. 35.

In this paper some general formulas for seismic prospecting have been developed and applied in the cases of horizontal layering, including rectangular intrusions, such as salt domes. The results may be extended to other structures, such as faults and tilted layers.

The primary problem has been that of a prism of salt embedded in the lowest layer of a group of homogeneous horizontal beds. While the principal attempt has been to make the analysis of the various possible cases, a few more general conclusions may be drawn. Some are:

1. In many cases of refraction prospecting the customary methods of analysis may lead to false determinations of depth, the calculated depth being too small.

2. For a dome whose top is fairly near the top of the embedding layer, the edges may be determined, at least approximately.

3. The results shown in the numerical example refer only to the selected system, as to magnitudes, but are typical of what may be expected in other cases.

4. The effective limits and the maximum depth at which a salt dome may be detected may be determined for assumed conditions.

5. If the medium has a speed varying linearly with the depth the path of the wave is a circle, while the path is a straight line if the medium is homogeneous.

6. For determining the thickness of a single layer a graphic or a least-square method is convenient in interpreting reflection data.

7. If the refraction time-distance profile consists of several straight line sections, it is possible to determine the depth of the contact causing each section.--Author's abstract.

## 4. ELECTRICAL METHODS

### (1734) ON THE FLOW OF ELECTRIC CURRENT IN SEMI-INFINITE STRATIFIED MEDIA

By Louis V. King

Proceedings of the Royal Society, London, series A,
vol. 139, 1933, pp. 237-277.

The problem dealt with in the present paper is to build up a theory of electrical conduction in stratified media which will enable the nature of the stratification to be deduced from measurements of surface potential gradients. A number of simple problems of practical interest is examined. Mathematical discussion is given under the following headings:

1. Introduction.
2. The electrical current function $\psi$. The surface gradient characteristic, $\zeta/\varsigma$.
3. On the determination of the current function $\psi$ for stratified media.
4. Homogeneous medium, bounded by insulating plane $Z=h$.
5. Homogeneous medium, bounded by a perfectly conducting plane $Z=h$.
6. Two media in contact bounded by insulating plane.
7. Two media bounded by insulating plane.
8. Layer of thickness $h$ bounded by semi-infinite medium.

9. Layer of thickness $\underline{t}$ and specific resistance $\underline{\rho}'$ embedded in semi-infinite homogeneous medium.

10. General methods of approximation. The characteristic function.

11. Application of Hankel's inversion theorem to analysis of field observations.

12. On the interpretation of some simple types of field graphs.

13. On the effect of frequency on surface potential distributions.

14. Summary and conclusions.

In an appendix are discussed points of mathematical interest relating to details of calculation in various sections.--W. Ayvazoglou.

## (1735) ELECTROMAGNETIC SHIELDING AT RADIO FREQUENCIES

By Louis V. King

Philosophical Magazine, ser. 7, vol. 15, February 1933, pp. 201-223.

The author's conclusions read as follows:

1. It is possible to calculate the alternating field inside a closed conducting spherical shell of uniform thickness placed in a uniform alternating magnetic field, such as that due to plane electromagnetic waves of large wave length compared to the linear dimensions of the shell in question.

2. Corresponding formulas also may be obtained for cylindrical shells of uniform thickness.

3. In the case of "thin" shells formulas suitable for numerical calculations are obtained, valid over the entire range of frequencies from a few cycles per second to radio frequencies.

4. A method of calculating the shielding ratio for thin shells is developed which makes direct use of the differential equation for current distribution in the shell, and of it asymptotic solutions. This method makes it possible to extend the calculations and take into account the effect of magnetic permeability on the shielding ratio. The method also makes it possible to calculate the shielding ratio for other shapes than thin cylindrical or spherical shells, as, for instance, ellipsoidal shells and others defined by appropriate curvilinear coordinates.

5. Numerical calculations indicate marked advantage in the use of shielding containers of iron. Finally to substantiate this conclusion experimental data on the effective magnetic permeability of iron at radio frequencies are required.

6. A formula showing approximately the shielding ratio at radio frequencies is given.--Author's summary.

## (1736) THE CALCULATIONS OF ELECTRICAL RESISTIVITY FOR A REGION UNDERLYING TWO UNIFORM LAYERS

By Irwin Roman

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 38, nos. 2 and 3, 1933, pp. 117-140 and 185-202.

In a previous paper (Tech. Paper 502, Bureau of Mines, see Geophys. bs. 31, p. 285) Roman obtained formulas and tables for computing the apparnt electrical resistivity of a bed underlying a single uniform layer. The resent paper is an extension of the previous one. In this paper a complete eries solution has been developed for the following problem, the boundaries eing taken horizontally for definiteness. The upper and lower regions exend to infinity in three directions and are separated from each other by wo parallel layers of finite thickness. A current source (or electrostatic harge) is located in the upper of the two layers. The potential is desired or every point of the space.

A simple geophysical case has been studied in more detail. In this case he upper layer is taken as a perfect insulator, and both current pole electrostatic charge) and potential electrode are taken at the upper surface of the earth).

ontents of the article:

Introduction.

Auxiliary notations and methods (purpose; range of counters; transformation of series; reflection factor and reflection complement; class and order; distribution factor; simultaneous recursion).

Formulation of the problem (the tectonics of the problem; potential conditions; potential structure; potential expressions; boundary conditions).

Solution of the general case (image positions; image-strength conditions; images of class 1; images of class 2; images of class above 2).

The simple geophysical case (principal potential in general; simple geophysical potential).

Comparison with prior literature (previous paper; Ehrenburg and Watson; Hummel).

Applications (multiple poles; disturbing factors; equal layers-general case, insulating bed, numerical example).

Summary.

--W. Ayvazoglou.

## (1737) ERDSTROMMESSUNGEN BEI PFAFFENREUTH

## (CURRENT MEASUREMENTS NEAR PFAFFENREUTH)

By J. B. Ostermeier and J. Spross

Metal und Erz, Berlin, vol. 30, no. 20, 1933, pp. 408-412.

The authors made earth-current measurements near Pfaffenreuth by applying the following new method: Stations of measurements were uniformly distributed, at 5 m distances from each other, over the whole area under investigation. The potential drop of the values obtained was determined with respect to the central station of the area under investigation, and then of the latter station with respect to a zero point a great distance outside the ore district. A compensation arrangement suitable for this purpose, allowing the equalization of the potential toward both the directions of the current, was used.

The exact form of the deposit, as well as the details, were represented by the picture with great certainty.

The wiring diagram of the arrangement is given in a picture.
--W. Ayvazoglou.

## (1738) L'EXPLORATION ÉLECTRIQUE DU SOUS-SOL ET SES APPLICATIONS À LA RECHERCHE MINIÈRE

## (ELECTRICAL PROSPECTING OF THE SUBSOIL AND ITS APPLICATION TO THE MINERAL PROSPECTING)

By R. P. de Ceccatty

Revue de l' industrie minérale, Paris, Sept. 15, 1933, no. 306, pp. 415-424.

Fundamental principles and the possibilities and advantages of the electrical methods of prospecting are discussed.--W. Ayvazoglou.

## (1739) DAS WIDERSTANDSVERFAHREN ZUR UNTERSUCHUNG VON TEKTONIK UND HYDROLOGIE DES UNTERGRUNDES

## (THE RESISTIVITY METHOD OF PROSPECTING FOR THE STRUCTURE AND HYDROLOGY OF THE SUBSOIL)

By W. Stern

Beiträge zur angewandten Geophysik (formerly Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik), vol. 3, no. 4, 1933, pp. 408-462.

This article deals with the theory, operation, and application of the apparent specific resistance method.

The fundamental conditions for the investigation of the homogeneous and horizontal layers of the subsoil and the methods for determining the depths of the borders of the horizontal layers resulting from these conditions are discussed. A new method for investigating the slanting layers and perturbed subsoil, and for determining the inclined borders (faults, flanks of horsts and grabens, synclines, and anticlines) is examined, theoretically explained and illustrated by examples. The original construction of the apparatus for measuring the apparent specific resistance and the special arrangements developed by the author are described. The results of numerous measurements referring to geology (investigation of mountain structures, depths, and directions of the borders of the layers) and to hydrology (determination of water arteries, their conditions, and depths of water levels) are mentioned, the resistance curves are presented, and their conformity with the borehole profiles are discussed.

The relation between the electrode separation and their working depth could be determined empirically; these values were found to be virtually equal to each other.--Author's abstract, translated by W. Ayvazoglou.

## 5. RADIOACTIVE METHODS

### (1740) COSMIC RAYS

Nature, London, vol. 132, no. 3337, 1933, p. 608.

Part 15 of the mathematics and physics section of the Sitzungsberichte, Prussian Academy of Sciences, contains a summary by Dr. V. F. Hess and Dr. R. Steinmaurer of the results obtained between Sept. 1, 1931, and Nov. 30, 1932, at the research station on the Hafelekar near Insbrück at an altitude of 2,300 m (see Nature, vol. 130, 1932, pp. 816 and 933; vol. 131, 1933, p. 713; and vol. 132, 1933, p. 601). An increase of 1 mm of mercury in the height of the barometer is found to cause a decrease of the rate of ionization in the constant-temperature ionization chamber of 4 parts per 1,000 when the chamber is completely lead-clad and a decrease of 5 parts per 1,000 when the upper part of the lead covering is removed--that is, when it is half-clad. An increase of temperature of the free air of 1°C. causes a decrease of 1 part per 1,000 for the fully clad and a much smaller effect for the half-clad chamber. No regular variation with the time of year has been observed. The day ionization rate exceeds that of the night by 2 parts per 1,000 for the fully clad and 3 parts per 1,000 for the half-clad chamber, the maximum rate occurring at 14 o'clock. No connection appears to exist between the intensity of cosmic radiation and sidereal time.--Editorial note.

## (1741) COMPARISON OF METHODS FOR COUNTING THE IONS IN THE ATMOSPHERE

By H. T. Graziadei

Physikalische Zeitschrift, Leipzig, vol. 34, no. 2, 1933, pp. 82-88.

The fitness of an arrangement for the elimination of the opposing field which appears at the entrance point of the air current if the charge method suggested by W. F. G. Swann is used, was tested. The charge method improved by this arrangement was found to yield, under the same experimental conditions, results comparable in value with those obtained by the discharge-method (especially if the inner electrodes were of the same length).

The relatively long inner electrode, essential to Swann's method, however, resulted in the fact that a considerable number of intermediary ions also were caught; thus the number of ions obtained may appear to be too great (under the conditions carried on up to 33 percent).

The existence of periodic fluctuations in the ion content of the atmosphere, found by P. A. Sheppard, was not confirmed.--Author's abstract, translated by W. Ayvazoglou.

## 6. GEOTHERMAL METHODS

## (1742) THE STRENGTH OF THE EARTH

By J. S. de Lury

Journal of Geology, Chicago, vol. 41, no. 7, 1933, pp. 748-756.

Consideration of sources of local heat in crust and sub-crust and recognition of the significance of horizontal variations in geothermal gradients, and consequent irregularities of shallow geoisotherms, together lead directly to the interpretations that the levels of magma formation are relatively shallow and that in the levels of smoothly concentric geoisotherms (beneath the influence of shallow sources of heat), temperatures are so low that other factors decree a strength too great to permit a continuous zone of weakness for isostatic adjustment. The conception of the asthenosphere is criticized on other grounds and a mechanism is provided for disturbing, as well as for correcting, the isostatic balance.--Author's abstract.

## 7. UNCLASSIFIED METHODS

### (1743) SHARE OF GEOPHYSICAL METHODS IN THE COURSE OF OPERATIONS OF GEOPHYSICAL PROSPECTING WORK (IN RUSSIAN)

By J. N. Lepeshinski

Materials in connection with the methodology of the search and prospecting for minerals, Moscow, 1931, pp. 309-328.

The author gives a brief account on the various methods of geophysical rospecting and discusses the fundamental questions which can be solved by hem.

Principles of (1) electrical, (2) magnetic, (3) gravimetrical, (4) eismic, (5) radioactive, and (6) geothermal methods are examined.--W. Ayvazoglou.

### (1744) ELEMENTS OF GEOPHYSICAL PROSPECTING

By C. A. Heiland

Quarterly, Colorado School of Mines, Golden, vol. 28, no. 4, 1933, 52 pp.

The pamphlet deals with the elements of geophysical prospecting as demonstrated at a Century of Progress, Chicago, 1933, in the geophysics section of the American Petroleum Industries exhibit. The purpose of the geophysics exhibit was to demonstrate the fundamental principles in as elementary a manner as possible by animated exhibits, showing the relation of instrument deflection, geophysical data, physical rock properties, and geologic structure.

The book is illustrated by many photographs.--W. Ayvazoglou.

### (1745) STUDY OF OVERHANGING SALT ON VARIOUS DOMES OF COASTAL TEXAS AND LOUISIANA AREAS

By Sidney A. Judson and R. A. Stamey

Oil and Gas Journal, Tulsa, vol. 32, no. 21, 1933, pp. 16 and 30.

The term "salt overhang" will, according to the authors, be construed in this paper to mean a portion or ledge of salt attached to and protruding outward from the central mass of a salt dome.

The general theories for the cause of overhangs are reviewed. Geophysical methods serving for the advance detection of overhangs (torsion-balance surveys and seismic methods) are mentioned.

The known overhangs are described and general and specific examples shown by cross-section.--W. Ayvazoglou.

### (1746) OVERHANGING SALT ON THE DOMES OF TEXAS AND LOUISIANA

By Sidney A. Judson and R. A. Stamey

Oil Weekly, Houston, vol. 71, no. 11, 1933, pp. 18-24;
no. 12, pp. 18-22; and no. 13, pp. 18-24.

The general theories for the cause of overhangs are reviewed. The known overhangs are described and general and specific examples are shown by cross sections.

Geophysical methods (torsion-balance and seismic) are mentioned as a means in determining in advance whether or not a dome has overhanging salt. --W. Ayvazoglou.

### (1747) CONTRIBUTION À L'ÉTUDE DES PHÉNOMÈNES QUI ACCOMPAGNENT LES ACCUMULATIONS DE GAZ DANS LE RECOUVREMENT D'UN GISEMENT PETROLIFERE

(CONTRIBUTION TO THE STUDY OF PHENOMENA ACCOMPANYING THE ACCUMULATION OF GAS IN THE COVER ROCKS OF OIL-BEARING FIELDS)

By D. Chahnazaroff

World Petroleum Congress, Imperial College of Science and Technology,
South Kensington, London, July 19-25, 1933, Preprint 4, 6 pp.

In this paper the author expresses the hypothesis that all the considerable accumulations of gas cannot have originated in the strata covering the oil-bearing field but that they have reached that formation from lower horizons. Gas may be freed from oil-impregnated strata by changes in thermodynamic conditions, temperature, and pressure. The effects of rise of temperature as a function of depth, the neighborhood of magmatic masses, and the presence of faults are discussed.--W. Ayvazoglou.

### (1748) LA CONSTRUCTION DES CARTES DES "PROFONDEURS-GÉOTECHNIQUES" APPLIQUÉS DANS LA GÉOLOGIE PETROLIFÈRE

(PREPARATION OF MAPS OF "GEOTECHNICAL DEPTHS" APPLIED IN THE PETROLEUM GEOLOGY).

By D. Chahnazaroff

World Petroleum Congress held at the Imperial College of Science and
Technology, South Kensington, London, July 19-25, 1933. Preprint 27,
5 pp.

The preparation of maps showing important horizons, characterized by lithology, which may serve to the driller is discussed. To make such information constantly available at short notice the author suggests the preparation of a series of maps of "geotechnical depths". The surveyor first prepares a contoured map of the surface of the oil-field area. Then subsurface contoured maps of important horizons are prepared. Using these figures as a basis a final map is prepared showing lines of equal depth from the surface of these horizons.--W. Ayvazoglou.

## (1749) ÉTUDES DES EAUX PÉTROLIFÈRES

## (STUDY OF PETROLIFEROUS WATERS)

By D. Chahnazaroff

Les Matières grasses, Paris, nos. 305 and 306, Sept. 15 and Oct. 15, 1933.

The possibility of applying geodensimetric measurements for determining the direction of the movement of the petroliferous waters, which are characterized by their micro-and brady-movement, is described in the first part. The second part deals with the causes of the micro-and brady-circulation of the petroliferous waters, as well as with the determination of the quantities which must be measured to establish the direction of the movement of the petroliferous waters.--Author's abstract.

## (1750) LES EAUX PETROLIFÈRES

## (OIL-BEARING WATERS)

By D. Chahnazaroff

Annales Guebhard-Séverine, Neuchatel, no. 9, 1933.

This is the continuation of the article published in the same magazine no. 8, 1933 (see Geophys. Abs. 50, p. 846). After having examined the astrophysical conditions accompanying the formation of sea waters, the author studies the question of distribution of waters according to single closed basins, their biological evolution, and hydrostatic conditions by which the formation and distribution of oil-bearing deposits, characterized by their chemical and physical properties, is caused.--Author's abs., translated by W. Ayvazoglou.

## (1751) STAND UND AUSSICHTEN DER ERDÖLGEWINNUNG IN NORDDEUTSCHLAND

## (CONDITIONS AND PROSPECTS OF OIL PRODUCTION IN NORTH GERMANY)

By H. Werner

Glückauf, Essen, vol. 69, no. 40, 1933, pp. 933-942,
and no. 41, 1933, pp. 961-969.

In the second part of this article Werner discusses geophysical methods of prospecting for oil. The excellent results obtained by these methods in the Gulf coast of the United States are mentioned. According to the author about 25 previously unknown salt domes were discovered in North Germany by geophysical methods.--W. Ayvazoglou.

## (1752) TAGUNG DER DEUTSCHEN GESELLSCHAFT FÜR ERDÖLFORSCHUNG

## (MEETING OF THE GERMAN OIL-PROSPECTING SOCIETY)

By W. Gollmer and P. Kukuk

Glückauf, Essen, vol. 69, no. 43, 1933, pp. 1018-1021.

The meeting was held in Berlin from September 12 to 19, 1933. During the meeting of the section on geology and geophysics various problems in connection with the prospecting for oil deposits were discussed.

Prof. Dr. Barsch delivered a lecture on the Systematic Geophysical Exploration of Germany as a Basis for Future Geological Prospecting for Oil (Planmassige geophysikalische Erforschung Deutschlands als Grundlage weiterer erdölgeologischer Aufschlussarbeiten). The lecturer emphasized the necessity, in the first place, of covering the plains of Germany with a widespread net of geophysical stations and of carrying on special investigations in zones having greater importance by using seismic, electrical, and gravimetrical methods.

Prof. Dr. Reich answered the question: "What practical demands must be made by the springing up of new geophysical methods and of the new instruments?" (Welche praktische Anforderungen müssen an neu auftauchende geophysikalische Verfahren und instrumente gestellt werden?) Reich discussed the geophysical methods now in use (especially the gravimetrical and electrical) and advised against use of instruments which were not sufficiently tested. In his opinion the purpose of the geophysical field measurements must in the first place be concentrated on as many measurements at as many points of observation as possible and not in the attaining the highest accuracy.--W. Ayvazoglou.

## (1753) SUGARLAND OIL FIELD, FORT BEND COUNTY, TEX.

By W. B. McCarter and P. H. O'Bannon

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 17, no. 11, 1933, pp. 1362-1386.

The Sugarland structure was, according to the authors, the first of the deep and moderately deep salt domes found by geophysical (seismic) methods, over which large sand sheets were arched to form a petroleum reservoir. The author's abstract of the article reads as follows:

> The Sugarland oil field overlies a moderately deep salt dome which arched the supercap sedimentary beds. Evidences of several local unconformities, brought about by erosion of the crest of the cap rock and the

verlying Vicksburg formation, and submarine erosion in the Middle Oligocene ormation with resulting sedimentary texture changes, and local thinning of everal formations are shown. Altogether 1,256 acres have produced (March 933) 16,762,597 barrels of oil, an average acre yield of 13,226 barrels. he water line has closed in uniformly around the structure. In the fourth ear of pressure maintenance the reservoir pressure is 1,345 pounds per quare inch compared with 1,550 pounds originally. The observance of ottom-hole pressure phenomena in several edge wells suggested that the pproach of edgewater could be foretold.

## 9. NEW BOOKS

(1754) Physics of the Earth. - VI. Seismology. Bulletin of the National Research Council, Washington, D. C. No. 90, October, 1933, 223 pp. 28, figs. Price: paper, $2; cloth, $2.50. The book is prepared by the subsidiary committee on seismology under the chairmanship of James B. Macelwane. In the preface to the book Macelwane notices that it was originally intended that the portions contributed by each of the members would be discussed, modified, if necessary, by the committee, and finally blended by the chairman into a continuous treatise. This plan was abandoned owing to financial difficulties, and instead each author assumed the entire responsibility for the chapters he has written. Numerous references are given through the bulletin. Contents of the book: Chapters 1. Definition and Classification of Earthquakes, by J. B. Macelwane. 2. Tectonic Earthquakes, by J. B. Macelwane. 3. Volcanic Earthquakes, by H. O. Wood. 4. Plutonic Earthquakes, by J. B. Macelwane. 5. Impact of Rock-Fall Earthquakes, by J. B. Macelwane. 6. Earthquake Investigation in the Field, by H. O. Wood. 7. "Apparent" Intensity and Surface Geology, by H. O. Wood. 8. Magnetic Effects Attributed to Earthquakes, by H. F. Reid. 9. Mechanics of Earthquakes. Rebound Theory. Regional Strain, by H. F. Reid. 10. The Conception of the Focus, by H. F. Reid. 11. Earthquake Body Waves, by J. B. Macelwane. 12. Reflection and Refraction of Earthquake Waves, by J. B. Macelwane. 13. Earthquake Surface Waves, by J. B. Macelwane. 14. Paths and Velocities of Earthquake Waves in the interior of the earth, by J. B. Macelwane. 15. Principle of the Seismograph, by J. A. Anderson. 16. Analysis of Seismograms of Near Earthquakes, by P. Byerly. 17. Records of Earthquakes at Intermediate and Great Distances, by P. Byerly. 18. Time-Distance Curves, by P. Byerly. 19. Reduction of Trace Amplitudes, by P. Byerly. 20. Seismic Geography, by P. Byerly. Index.

The following volumes have already appeared in the bulletin series of the National Research Council: No. 77, Volcanology; No. 78, The Figure of the Earth; No. 79, Meteorology; No. 80, The Age of the Earth; No. 85, Oceanography.

(1755) Schweidler, Egon: Die Aufrechterhaltung der elektrischen Ladung der Erde (Maintenance of the Electric Charge of the Earth), 1932, 68 pp., 8 figs., by Verlag von Henri Grande, Hamburg. The first of the five chapters gives a brief review of the historical development of our knowledge of atmospheric electricity. This is followed by a general view of the present status of the subject. The third chapter is devoted to systematic and critical discussion of various attempts at solving the fundamental problem. A summary (chaptor 4) and an extensive bibliography (chapter 5) complete the work.

(1756) Vening Meinesz, F. A. Gravity expeditions at Sea, 1923-1930, vol. 1. The Expeditions, the Computations and the Results. Publication of the Netherlands Geodetic Commission, 109 pp. and 2 plates., 1932. Delft, J. Waltman, Jr. The book deals with the measurements of gravity, their errors, and their reduction to the sea level. Their interpretation and the isostatic reductions will form the subject of the second volume.

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.A. No. 58 UNITED STATES BUREAU OF MINES February, 1934.

Scott Turner, Director

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# GEOPHYSICAL ABSTRACTS
MINING DIVISION

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Compiled by Frederick W. Lee

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# 1. GRAVITATIONAL METHODS

## (1757) ON THE POSSIBILITY OF TAKING GRAVITY MEASUREMENTS AT SEA ON BOARD AN ORDINARY VESSEL

By Chuji Tsuboi

Proceedings of the Imperial Academy, Tokyo, vol. 9, no. 8, 1933, pp. 374-377.

According to the author the method for taking gravity measurements at sea on board an ordinary vessel has proved to be practicable, at least so far as the preliminary experiments were concerned.

The newly devised apparatus is briefly described, and laboratory tests made of the apparatus on a shaking table gave satisfactory results. Part of the records obtained during a short trip across the Sagami Bay from Tokyo to Simoda are given.

A more complete apparatus is now under construction, upon completion of which further experiments will be made. The results will appear in the Bulletin of the Earthquake Research Institute.--W. Ayvazoglou.

## (1758) RELATIVE GRAVITY DETERMINATION BY MEANS OF SHORT WIRELESS WAVE COMMUNICATION

By Motoharu Kimura

Proceedings of the Imperial Academy, Tokyo, vol. 9, no. 8, 1933, pp. 370-373.

In the ordinary method for relative determination of gravity, an invariable pendulum is taken to the different stations where the gravity values are to be measured, and the oscillation periods of the pendulum at these stations are determined in terms of a chronometer beat; but the uncertainty in the time rate of the chronometer during the determination is one of the chief sources of error which affect the accuracy of the results of the determination.

In this article Kimura describes briefly the experiments carried out by him in which the periods of a gravity pendulum at a field station were compared directly with that of another pendulum at a certain base station by establishing communication between the field and base stations by means of the short wireless wave.

Schematic designs of the transmitting and receiving systems are given.

The results obtained proved quite satisfactory.

The complete paper will appear in one of the next numbers of the Bulletin of the Earthquake Research Institute.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (1759) MAGNETISCHE VEKTORENMETHODE FÜR ERFORSCHUNG VON REGIONALEN UND LOKALEN GEOLOGISCHEN STRUKTUREN UND IHRE ANWENDUNG AUF MAGNETISCHE STÖRUNGEN ÜBER EUROPA

(MAGNETIC VECTOR METHOD FOR INVESTIGATING THE REGIONAL AND LOCAL GEOLOGIC STRUCTURES AND ITS APPLICATION TO THE MAGNETIC DISTURBANCES OVER EUROPE)

By W. P. Jenny

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 2/3, 1933, pp. 187-197

The magnetic vector method endeavors to restrict the multitude of possible geologic interpretations of anomalies by determination of the intensity and direction in space of the local magnetic forces. Intensity and direction in space are plotted at each station by means of a vector triangle. The components of the vector triangle represent the differences between the observed values for the declination, the south-north horizontal intensity and vertical intensity, and the respective "normal" values for the same station. From the observed values may be deducted, all according to the definition of the "normal" field, the homogeneous earth's magnetic field, continental, regional, and local fields.

The applicability of the vector method is demonstrated by a study of the magnetic map of Europe.--Author's abstract.

### (1760) SESTROJOVANI MAGNETICKÝCH MAP

(CONSTRUCTION OF MAGNETIC CHARTS)

By Fr. Čechura

Sbornik Československé společnosti zemépisné, Prague
(Magazine of the Czechoslovak Geographic Society)
vol. 39, no. 7/8, 1933, pp. 1-9

The problem of constructing magnetic charts is discussed under the following headings:

1. Theoretical isomagnetic lines;
2. Actual isomagnetic lines;
3. Importance of the magnetic survey for determining the picture of the actual earthmagnetic field;
4. Construction of magnetic charts based on the survey of the earthmagnetic field.

The author also suggests how to indicate the different kinds of disturbances on the charts.--W. Ayvazoglou.

### (1761) MAGNETICKA DEKLINACE V PODKARPATSKE RUSI PRO EPOCHU 1932.0

### (MAGNETIC DECLINATION IN THE LOWER CARPATHIAN FOR THE EPOCH 1932.0)

By Fr. Čechura

Sbornik Prirodovedeckého Klubu v Košiciach
(Magazine of the Natural History Club in Košici),
vol. 1, 1932, pp. 1-11

The author describes his work in 1929 for determining the general character of the terrestrial magnetic field in the Lower Carpathian. Observations were made at 14 stations.

Tables and maps are added.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1762) STUDY ON THE PROPAGATION OF SEISMIC WAVES (2D PAPER)

### (THE MECHANISM OF THE ORIGIN, THE CRUSTAL STRUCTURE AND THE AMPLITUDE OF SEISMIC WAVES)

By Hiroshi Kawasumi

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 11, no. 3, 1933, pp. 403-453

The first paper on this subject was published in the Bulletin of the Earthquake Research Institute, vol. 10, no. 1, 1932, pp. 94-129 (see Geophys. Abs. 38, p. 477). The contents of this paper are as follows:

1. Historical review of the former investigations.
2. General solution of spherical waves propagated in an isotropic elastic medium.
3. The crustal structure and the amplitude of seismic bodily waves.
4. Amplitude of seismic waves and the mechanism of occurrence of the deep-seated Central Japan earthquake of June 2, 1931.

The article is to be continued.--W. Ayvazoglou.

## (1763) VORSCHLAG EINER NEUEN NOMENKLATUR FÜR NAHEBEBENDIAGRAMME

## (SUGGESTION REGARDING A NEW NOTATION FOR THE PULSES IN NEAR EARTHQUAKES)

By H. Jeffreys

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 1, 1933,
pp. 96-109

The notations $\bar{P}$ and $\bar{S}$ for the pulses observed at short distances in near earthquakes were introduced by A. Mohorovicic. Owing to great difficulties in printing these notations, Jeffreys suggests replacing them with Pg and Sg and to use the latter notations internationally.

In this article the opinions regarding this suggestion, expressed by a number of seismologists, are discussed.--W. Ayvazoglou.

## (1764) ÜBER ZUSAMMENHÄNGE VON TIEFHERDBEBEN MIT ANDEREN GEOPHYSIKALISCHEN ERSCHEINUNGEN

## (ON THE RELATIONSHIP OF DEEP-FOCUS EARTHQUAKES WITH OTHER GEOPHYSICAL PHENOMENA)

By H. Landsberg

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 2/3, 1933,
pp. 238-243

Deep-focus earthquakes show annual periodicity, with the maxima at the equinoxes and minima at the solstices. In spite of the similarity in annual periodicity of the magnetic disturbances no real connection can be expected betweem the two phenomena. It is shown that in the case of the earthquakes the pole-shift variations resulting from air-mass disturbances may be the cause. The earth-magnetic disturbances may be explained by the influences of high layers of the atmosphere which also are influenced by the strong changes of the general circulation at the equinoxes.--Author's abstract, translated by W. Ayvazoglou.

## (1765) ONDES LONGUES DANS LA PREMIÈRE PHASE DES SÉISMOGRAMMES

## (LONG WAVES IN THE FIRST PHASE OF SEISMOGRAMS)

By O. Somville

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 2/3, 1933,
pp. 333-338

In this article Somville discusses the opinion expressed by Agamennone with regard to the investigations with PL-wave published by him in Gerlands Beiträge zur Geophysik, vol. 27, 1930, p. 437; vol, 29, 1931, p. 247, and vol. 33, 1931, p. 31. (See Geophys. Abs. 21, 26, and 32).--W. Ayvazoglou.

## (1766) SOME PROBLEMS ON THE PROPAGATION OF EARTHQUAKE WAVES

By K. Wadati

Proceedings of the Imperial Academy, Tokyo, vol. 9, no. 9,
1933, pp. 494-497

Wadati discusses the problems of the propagation of earthquake waves under the following headings:

1. Travel time of the $P'$ wave observed near the antipodes of the epicenter.--These travel times for ordinary as well as deep-focus earthquakes are shown in a table. Values obtained by Macelwane are given in the same table for comparison.

2. ScS wave observed near the epicenter and depth of the earth's core.--A diagram showing the observed travel times and the calculated travel-time curves of ScS wave and a diagram showing the relation between $\triangle$, H and S-P, ScS-P are given.

3. Focusing phenomenon of reflected waves.--A seismogram showing the S wave observed at Taihoku is added.--W. Ayvazoglou.

## (1767) VELOCITY OF ELASTIC WAVES IN GRANITE AND NORITE

By L. Don Leet

Physics, Lancaster, Pa., vol. 4, no. 10, 1933, pp. 375-385

The velocities of elastic waves were investigated in granite at Rockport, Mass., and norite at Sudbury, Ontario. The waves measured were generated by dynamite explosions and recorded by portable seismographs at distances up to 6,260 feet in granite and 10,320 feet in norite. The observed velocities in km/sec. with probable errors indicated by ± were:

| | Longitudinal | Transverse | Rayleigh |
|---|---|---|---|
| Rockport granite | 5.14 ± 0.005 | 2.70 ± 0.02 | 2.19 ± 0.007 |
| Sudbury norite | 6.22 ± 0.003 | 3.49 ± 0.006 | 2.79 ± 0.01 |

From these velocities and the densities of specimens taken from the shooting location the following elastic constants may be computed. They are shown below, for comparison, with those computed by a similar procedure in an earlier report for Quincy (Mass.) granite. (L. D. Leet and W. M. Ewing, Physics, vol. 2, p. 160, 1932, see Geophys. Abs. 38, p. 475.)

A quartz-rich zone in the norite was found to transmit the waves more slowly. The results are compared with static measurements of Zisman on rocks from the same locations, part of the same program of geophysical research at Harvard. Compressibility, measured directly under hydroscopic pressures on specimens exposed to the liquid transmitting the pressure, is found to be the only statically determined constant which yields seismically effective values. The geological significance of granite velocities and elastic constants is discussed.

It is concluded that a longitudinal-wave speed of 5.5 km/sec. cannot be regarded as unique for granite, or even necessarily suggestive of granite, as has been repeatedly proposed; and that there is as yet no seismological justification of any "layer" of the earth's crust as either sedimentary or granitic.

| | Quincy granite | Rockport granite | Average granite | Sudbury norite |
|---|---|---|---|---|
| Density (grams/cm$^3$) | 2.61 | 2.63 | 2.62 | 2.85 |
| Rigidity x $10^{-11}$ (dynes/cm$^2$) | 1.63 | 1.92 | 1.78 | 3.47 |
| Bulk modulus x $10^{-11}$ (dynes/cm$^2$) | 4.4 | 4.4 | 4.4 | 6.4 |

| | Quincy granite | Rockport granite | Average granite | Sudbury norite |
|---|---|---|---|---|
| Young's modulus x $10^{-11}$ (dynes/cm$^2$) | 4.3 | 5.0 | 4.65 | 8.82 |
| Compressibility x $10^{13}$ (cm$^2$/dyne) | 22.8 | 22.8 | 22.8 | 15.6 |
| Poisson's ratio | .33 | .31 | .32 | .27 |

--Author's abstract.

## (1768) SENSITIVENESS OF FISH TO EARTHQUAKES

Editorial Note

Nature, London, vol. 132, no. 3343, 1933, p. 817

The sensitivensss of catfish to earthquakes was observed by two Japanese seismologists Dr. Shinkishi Hatai and Dr. Noboru Abe. Catfish placed in an aquarium were tested three times a day by tapping on the supporting table. When no earthquake was impending, the fish moved lazily or not at all; but about 6 hours before a shock the fish jumped when the table was tapped and sometimes swam about agitatedly for a time before settling down upon the bottom again. Several months' testing showed that in a period when 178 earthquakes of all degrees of severity had been recorded the fish had predicted correctly 80 percent of the shocks. The experimentors think that the catfish are made sensitive through electrical changes in the earth, since it was only when the aquarium was electrically earthed through the drainpipe that they responded to a coming earthquake.--W. Ayvazoglou.

## (1769) EARTHQUAKE NOTES

Edited by R. R. Bodle

Eastern Section, Seismological Society of America, Washington, D. C., vol. 5, no. 3, 1933, pp. 1-8

This volume contains a brief description, by J. B. Macelwane, of the Fifth General Assembly of the International Union of Geodesy and Geophysics in Lisbon, Portugal, September 18-24, 1933.

Besides, abstracts of the following papers are given: (1) Grover (Mo.), Earthquake November 16, 1933; (2) Earthquake Design for an Apartment House; (3) Instrumental Changes at Ottawa; (4) Technology (Maine) Seismograph Station; (5) Normal-Focus Seismic Tables; (6) Principal Earthquakes in California Listed; (7) Earthquakes of the World Listed; (8) Seismic Instruments at a Century of Progress; (9) Strong-Motion Earthquake Records Studied; (10) The Deep-Focus Earthquake Problem; (11) Items of Personal Interest; (12) Instrumental Comparison and Calibration; (13) Lectures on Seismology; (14) Surplus of Proceedings and Supplement 1930 Meeting - Attention Is Called to the Fact that the Eastern Section Still Has on Hand a Series of Articles of Interest; (15) Epicenters.--W. Ayvazoglou.

## 4. ELECTRICAL METHODS

### (1770) NOUVEAUX GISEMENTS PÉTROLIFÈRES DETERMINÉS À L'AIDE DE LA GEOPHYSIQUE APPLIQUEE

(NEW OIL-BEARING DEPOSITS DETERMINED BY MEANS OF APPLIED GEOPHYSICS)

By Valeriu Patriciu

Pamphlet published in Bucharest (Rumania), 1933, 12 pp.

The author describes the application of the electrical methods of prospecting developed by Sundberg for determining the geologic structure of the subsoil based on the different electrical conductivity of the layers. The theory and interpretation of the measurements are discussed.

The second part of this pamphlet deals with the actual measurements carried out in Rumania (regions of Viforata, Margineni-Ghirdoveni, Nedelea, Tufeni, Valea Calugareasca-Chitorani-Bucov), where several new anticlines have been discovered. A map of the area and cross-sections of the regions investigated are added. The author concludes that, considering the results obtained by using the "Sundberg" method, for determining the structure of the subsoil and taking into consideration the geological condition of the regions investigated, there is a large field open for the application of this electrical method of prospecting.--W. Ayvazoglou.

### (1771) THE INTERPRETATION OF THE RESISTIBILITY PROSPECTING METHOD FOR HORIZONTAL STRUCTURES

By L. B. Slichter

Physics, Lancaster, Pa., vol. 4, no. 9, 1933, pp. 307-322

The direct problem of deducing from electrical potentials observed at the surface of a horizontally uniform earth the unknown variation of the conductivity with depth reduces to a boundary value problem of universal type. Its solution for the isotropic case is developed in part I. In part II the more usual inverse problem is solved for some special classes of conductivity functions, and graphic examples are given as an aid in guiding the interpretation work. In part III, the anisotropic case is discussed.--Author's abstract.

NOTE:- In vol. 4, no. 11, 1933, of Physics Slichter draws attention to the following correction to be made:

In the paper of the above title which appeared in the September issue (vol. 4, no. 9), figures 3 was repeated for figure 4. The correct figure is given here.

### (1772) AN INVERSE BOUNDARY VALUE PROBLEM IN ELECTRODYNAMICS

By L. B. Slichter

Physics, Lancaster, Pa., vol. 4, no. 12, 1933, pp. 411-418

From knowledge of the electromagnetic field at the surface of a half space due to a prescribed oscillatory source is determined the unknown variation with depth of the conductivity and the dielectric constant. Unique solutions exist for these quantities.--Author's abstract.

## 5. RADIOACTIVE METHODS

### (1773) BEMERKUNGEN ZU MEINEN BISHERIGEN KERNZÄHLUNGEN UND ZUR FRAGE DER JONENLADUNG

(REMARKS CONCERNING MY PREVIOUS DUST-COUNTINGS AND CONCERNING THE QUESTION OF THE IONIC CHARGE)

By H. Israel

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 1, 1933, pp. 29-43

Owing to the error in the scale division of the Aitken dust counter, the figures given previously by the author are too high. The necessary corrections are included.

The fact that the four Aitken apparatus obtained during the last 10 years from one firm have almost the same errors makes it possible to suppose that all the instruments manufactured during this time have the same error in the scale division. In connection with this, the ratio of the uncharged and charged nuclei in the atmosphere is discussed, and it is proved that the discrepancies which exist in connection with this ratio and the absolute figures of the nuclei are of a systematic nature and can be explained easily by assuming that one part of the large ions bears more than one electronic charge.

The increase of the relative humidity probably favors taking up more than one electronic charge.--Author's abstract, translated by W. Ayvazoglou.

## (1774) DIE EXHALATION DER RADIUMEMANATION AUS DEM ERDBODEN UND IHRE ABHÄNGIGKEIT VON DEN METEOROLOGISCHEN FAKTOREN

## (THE EXHALATION OF RADIUM EMANATION FROM THE GROUND AND ITS DEPENDANCE ON METEOROLOGICAL FACTORS

By Walter Kosmath

Gerlands Beiträge zur Geophysik, Leipzig, vol. 40, no. 2/3, 1933,
pp. 226-237

In this first part of the paper the method of Joly and Smyth is criticized. Then the conditions are explained which must be fulfilled by a proper method of measuring the exhalation of the emanation at a definite time of day. Moreover a method is given which fulfills those conditions.

The results will be published in the second part.--Author's abstract.

## 6. GEOTHERMAL METHODS

## (1775) TEMPERATURMESSUNGEN IN BOHRLÖCHERN DER UMGEBUNG VON HAMBURG

## (TEMPERATURE MEASUREMENTS IN BOREHOLES IN THE VICINITY OF HAMBURG)

By E. Koch

Mitteilungen aus dem Mineralogisch-Geologischen Staatsinstitut in Hamburg,
vol. 14, 1933, pp. 53-80

Thirty-one temperature measurements made in the boreholes in the vicinity of Hamburg are described in detail. From the results of measurements the geothermal gradient for this region was calculated to be 29 to 39 meters, or a mean value of 34 meters per 1° C.

Smaller values (down to 18.93) were found in the region of an oil-bearing salt dome; higher values (up to 55.24) were explained by the effect caused by ground waters. The temperature measurements in the Lieth borehole near Elmshorn from 1872 to 1878 are discussed.--Author's abstract, translated by W. Ayvazoglou.

## (1776) GEOTHERMISCHE MESSUNGEN IN DEN ARTESISCHEN BOHRLÖCHERN VON CHARKOV UND MOSKAU WAHREND DES SOMMERS 1932

## (GEOTHERMAL MEASUREMENTS IN ARTESIAN BOREHOLES IN KHARKOV AND MOSCOW DURING THE SUMMER OF 1932)

By S. Kraskowski

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 1, 1933, pp. 76-87

In the summer of 1932 the author made a number of geothermal observations in the artesian wells in Kharkov and in Moscow. The purpose of the measurements in Kharkov was to investigate the distribution of the temperature in boreholes which penetrated the whole series of Cretaceous layers, the magnitude of the latter reaching about 550 meters. At the same time, it was desirable to know to what extent the course of the temperature curve was affected by the structural changes in the layers.

The measurements in Moscow were made in one borehole in the yard of the Institute of Geology and Mineralogy and in the borehole of the city slaughterhouse.

Based on the temperature obtained it was possible to calculate the geothermal gradient for Moscow and to establish the influence of the tubes inserted in the holes upon the distribution of the temperature.

The difference of the temperature readings in the holes with tubes and without them did not exceed ± 0.2 °C.; that is, the limits of the mean error for ordinary temperature measurements were not surpassed.--Author's abstract, translated by W. Ayvazoglou.

## (1777) ZUR GESCHICHTE DER GEOTHERMISCHEN TIEFENSTUFE

## (CONTRIBUTION TO THE HISTORY OF THE GEOTHERMAL GRADIENT)

By H. Geiler

Gesch. d. Math., d. Naturwiss, und d. Techn., vol. 13, 1931, pp. 352-358

A historical outline and explanations of the earth's heat are given based on the study of publications by Kayser, Koenigsberger, Sieberg, and others.

Factors influencing the geothermal gradient are assembled.--W. Ayvazoglou.

## 7. UNCLASSIFIED METHODS

### (1778) DEMONSTRATING GEOPHYSICAL SCIENCE TO THE PUBLIC

BY C. A. Heiland

Mining and Metallurgy, vol. 14, no. 323, 1933, pp. 455-458

Heiland gives a brief description of the geophysical exhibits at the Century of Progress Exposition in Chicago. A more detailed description can be found in the Quarterly of the Colorado School of Mines, Golden, Colo., vol. 28, no. 4, 1933. (See Geophys. Abs. 57).--W. Ayvazoglou.

### (1779) GEOPHYSICAL STUDIES IN PLACER AND WATER-SUPPLY PROBLEMS

By J. J. Jakosky and C. H. Wilson

American Institute of Mining and Metallurgical Engineers,
Tech. Pub. 515, 1933, 18 pp.

In recent years geophysical prospecting methods have become well established as important steps in economically initiating new mining ventures in base-metal exploration, placer mining, and water-supply problems. The value of these methods as applied to these problems has been greatly increased by new and improved instruments, and a greater degree of skill in laboratory and interpretative technique. Considerable success has been attained, with subsequent drilling checking the predicted depths within 1 to 5 percent, on problems requiring information on thickness of fill material, depth to and contour of bedrock, extent and yardage of gravels to be mined, and location of hydrostatic water table. In these applications the geophysical work gives data comparable to drilling and at a cost about one fiftieth that of drilling.

Discussion of several surveys, with accompanying illustrations showing geophysical methods applicable to both simple and complicated placer problems, is included in the paper. The electrical instruments for measuring electromagnetic field strength and surface potentials are described, and their use, with that of other geophysical instruments in modern field procedure, is noted.--Author's abstract.

## 8. GEOLOGY

### (1780) GULF COAST GEOSYNCLINE

By Donald C. Barton, C. H. Ritz, and Maude Hickey

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 17, no. 12, 1933, pp. 1446-1458

The presence of a geosyncline along the Gulf coast of Texas and Louisiana is indicated both by geologic and geophysical data. The formations exposed at the surface or in drilling are known, in general, to dip gulfward.

The known stratigraphic thickness of formations plus shrewd extrapolation below reach of the drill indicate that the depth to the basement at Houston is greater than 20,000 feet, at Jennings, La., greater than 25,000 feet, and south of New Orleans greater than 30,000 feet. Seismic prospecting indicates that the basement certainly is deeper than 15,000 feet and, less definitely, that it is deeper than 20,000 feet.

Torsion-balance data indicate that the base of the salt core of the salt domes lies at a depth of 17,000-20,000 feet in the Houston district. The depth of the Gulf of Mexico in the Sigsbee Deep is 12,500, and throughout most of its area, is less than 10,000 feet. The thickness of the post-Lower Cretaceous sediments in the central part of the Gulf of Mexico presumably is not more than a very few thousand feet. The basement of the post-Lower Cretaceous beds in the Gulf coast must be warped down at least 5,000 feet at Houston and at least 15,000 feet in the area south of New Orleans. A regional trough of gravity minimum lies axially along the Gulf coast. Calculations suggest that it is best explained by a geosyncline on the basement plus a progressive character of the basement from granitic under the land to basaltic under the Gulf of Mexico. A study of the depression of the basement to compensate sedimentation suggests that the trough line of the geosyncline should lie nearly at the present coast line; and that is approximately the position which the gravitational calculations indicated for the actual position of the trough line. Although isostatically negative, the area has been one of continued subsidence; and the rate of subsidence seems to have keep even pace with the rate of sedimentation.--Author's abstract.

## (1781) OVERHANGING SALT ON DOMES OF TEXAS AND LOUISIANA

By Sidney A. Judson and R. A. Stamey

Bulletin of the American Association of Petroleum Geologists, Tulsa,
vol. 17, no. 12, 1933, pp. 1492-1520

Overhanging salt has been found on 11 coastal and interior domes in Texas and Louisiana. The first ledge of salt drilled through was at Belle Isle, La., in 1898; the first oil produced from formations beneath salt was found at Anse la Butte, La., in 1902. However, oil was not extensively and prolifically produced until the overhanging was discovered at Barbers Hill in 1930.

The general theories for the cause of overhangs are reviewed. The present criteria for the advance recognition of overhangs are listed, and the probability of other overhangs is conjectured. The special methods required for drilling through cap-rock cavities and salt are described.

The known overhangs are described and general and specific examples are shown by cross sections.

A tabulation shows wells drilled through salt overhangs. (See also Geophys. Abs. 57.)--Author's abstract.

## 9. NEW BOOKS

(1782) Sineritz, Jose G. La interpretacion geologica de las mediciones geofisicas aplicadas a la prospeccion (Geological Interpretation of Geophysical Measurements Applied in Prospecting). Memorias del Instituto Geologico y Minero de Espana, Madrid, 1933, 536 pp., 37 maps; price, 25 Pesetas. The book consists of two parts: I. Seismic measurements, pp. 3-348; II. Gravimetric investigations, pp. 349-504.

## 10. PATENTS

### (1783) VIBRATION DETECTOR

Harvey C. Hayes, Washington, D. C.

U. S. Patent 1,923,088 Issued Aug. 22, 1933.

The present invention relates to an apparatus for detecting vibrations produced in the surface of the earth either in the form of sound waves or of waves having a frequency outside of the range of audibility. The apparatus has an elongated casing adapted to be supported in the earth vertically; a magnetic ring, secured therein in a horizontal position; an armature, mounted within this ring and having pole pieces slightly spaced from the ring and cooperating therewith, the cooperating faces of the ring and pole pieces being parallel and beveled at an acute angle with respect to the longitudinal axis of the caving coils on the armature; means for electrically energizing the coils to produce a flux between the ring and the pole pieces; means for supporting said armature and adapted to permit both longitudinal and transverse movement with respect to the casing; and means for indicating the variation in flux through said coils due to movements of either type.

Claims allowed - 3.

### (1784) MEASURING INSTRUMENT FOR INVESTIGATING GRAVITATION

Alfred Berroth, Potsdam, near Berlin, Germany

U. S. Patent 1,927,150 Issued September 19, 1933.

The present invention relates to apparatus for determining the variations in the attractive force between masses, particularly in the gravitational or magnetic attraction exerted on a body by the earth due to the fact that the field of force in which the body is situated varies.

The apparatus comprises an elongated mass suspended by its two ends within a closed vessel; an upright wire connecting the center of this mass to a means for applying an adjustable torque on it so as to deflect it from its position of stable equilibrium into a position of unstable equilibrium; and means to determine the variations occurring in said state of unstable equilibrium when the field of attraction to which the mass is submitted is varied.

Claims allowed - 3.

### (1785) METHOD AND APPARATUS FOR EXPLORING BOREHOLES

John C. Karcher, Dallas, Tex.

U. S. Patent 1,927,664 Issued September 19, 1933

This invention relates to a method for continuously exploring boreholes during the process of drilling, which consists in causing an electric current to flow through a conductor insulated from the drill stem of the hole-drilling mechanism and connected to the drill bit to cause the current to flow from the drill bit into the earth from which said current is collected and then causing the current to pass through measuring instruments for purposes of observation.

Claims allowed - 7.

### (1786) MEANS AND METHOD OF ELECTRICAL PROSPECTING

Norman H. Ricker, Houston, Tex.

U. S. Patent 1,934,447 Issued November 7, 1933.

This invention relates to a means and method of exploring the regions beneath the surface of the earth for deposits of petroleum, natural gas, asphalt, certain metallic sulphides, mineral masses, and other substances or formations whose electromagnetic constants differ from those of the surrounding earth.

The method of exploring consists of causing alternating electric currents to flow in the earth, determining at a series of points over the surface of the earth the angular position in space of the normal to the plane of the vibration ellipse of the electric field associated with said currents, and coordinating the data so obtained.

Claims allowed - 24.

### (1787) PROCESS OF AND DEVICE FOR DETECTING AND MEASURING MINIMUM ACCELERATIONS

Richard Ambronn, Göttingen, Germany

U. S. Patent 1,936,321 Issued November 21, 1933

This invention relates to a means of detecting and measuring minute accelerations, comprising a contact piece on a spring balance and another contact piece on a beam balance, or connection between these contact pieces and a suitable electric circuit, and a measuring means inserted in said circuit.

Claims allowed - 3.

### (1788) IMPROVEMENTS IN PENDULUMS FOR GRAVITY DETERMINATIONS

Carl Zeiss, of Carl Zeiss-Strasse, Jena, Germany

British Patent 394,081 Issued June 22, 1933.

The present invention relates to pendulums for gravity determinations provided with adjusting screws. These adjusting screws are given such positions that their axes lie in a plane containing the knife edge of the pendulum. The desired adjustment is arrived at by giving the screws suitable lengths. In addition to lying in the plane containing the knife-edge the axes of the screws also parallel the knife-edge.

Claims allowed - 7.

## (1789) IMPROVEMENT IN AND RELATING TO METHODS AND APPARATUS FOR LOCATING ORE AND THE LIKE

Hauser & Co. G.m.b.H., of Frauentorstrasse F, 9-12, Augsburg, Germany,
a German company, and Johann Baptist Ostermeier, of Hans-Sachsweg,
6 Mering, near Augsburg, Germany

British Patent 397,314 Issued August 24, 1933

This invention relates to a method of investigating subaqueous mineral deposits or conducting masses or mineral deposits, or conducting masses in moist media and includes the steps of submerging two electrodes of electrochemically equivalent conducting material, connected through a circuit containing a current or potential-difference-detecting instrument, in the water or medium, contacting the ore electrode with the mineral deposit whereby the said instrument shows a deflection, and then applying to the circuit a potential difference opposing that set up between the electrodes to reduce the deflection of the detecting instrument to zero and measuring on a separate measuring instrument the applied potential difference or a factor dependent thereon.

Claims allowed - 12.

## (1790) IMPROVEMENTS IN AND RELATING TO MAGNETIC BALANCES

Hauser & Co., G.m.b.H., of Frauentorstrasse F. 9-12, Augsburg, Germany,
a German company, and Johann Baptist Ostermeier of Hans-Sachsweg,
6 Mering, near Augsburg, Germany

British Patent 398,036 Issued September 7, 1933

This invention relates to a magnetic balance, particularly for field work, and consisting essentially of a movable magnetic system equipped with a reflecting face (mirror or prism) and arranged within a casing in such a manner that it may be rotated about an axis of rotation, characterized in this that the device for determining the inclination of the system consists of two optical systems of which one contains a reading mark and the other contains a scale, both optical systems forming the same angle with the mirror surface, so that an image produced by one of said systems may be observed through the other system.

An improved stopping device is provided also.

Claims allowed - 6.

## (1791) VISUELLE ABLESEVORRICHTUNG FÜR DREHWAAGEN

## (VISUAL READING DEVICE FOR TORSION BALANCES)

Hauser & Co. G.m.b.H., of Augsburg

erman Patent 579,433 Issued June 26, 1933.

This invention relates to torsion balances in which the ocular of the eading device is arranged at about half eye-distance from the perpendicular lane determined by the line connecting the weights of the two loads, the ptical axis of the reading device being parallel to this plane.

Claims allowed - 3.

## (1792) DISPOSITIF ÉLECTRIQUE POUR LA PRISE DE CAROTTES SUR LA PAROI LATÉRALE DES SONDAGES

## (ELECTRICAL DEVICE FOR TAKING CORES FROM THE WALLS OF BOREHOLES)

ociété de Prospection Électrique (Procédés Schlumberger) of France (Seine)

rench Patent 752,257 Issued September 20, 1933.

This invention refers to a device by which it is possible to draw conclusions, at any moment and at any depth, on the charges in the structure of the subsoil penetrated by drilling. Thus cores can be taken at the horizons considered important from the geological viewpoint.

The carrying out of the work is in conformity with the proceedings described in French Patents 673,113 and 728,592.

Claims allowed - 8.

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G.A. 59 UNITED STATES BUREAU OF MINES March 1934.
Scott Turner, Director

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# GEOPHYSICAL ABSTRACTS
## MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

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## 1. GRAVITATIONAL METHODS

### (1793) THE MOST SUITABLE FORMULA FOR THE JAPANESE GRAVITY VALUES

By Chuji Tsuboi

Bulletin of the Earthquake Research Institute, Tokyo, vol. 11, no. 4, 1933, pp. 632-633

In this article the author determines the ellipticity of the earth from the gravity values in Japan. For finding the most suitable formula gravity was determined at 123 stations. The ellipticity found by the author was $e = 1/322$, which is decidedly smaller than the value obtained from gravity measurements made in other parts of the world (1/298). According to the author this difference seems to indicate certain abnormal subterranean conditions prevailing in Japan, which is noted for its seismic and volcanic activities.--W. Ayvazoglou.

### (1794) MAGNETIZATION OF INVAR PENDULUMS

By E. C. Bullard

Proc. Cambridge Phil. Soc., vol. 29, May 10, 1933, pp. 288-296

The susceptibility of invar pendulums used for relative gravity determinations to magnetization, introducing changes in the period of oscillation which may amount to $48 \times 10^{-7}$ sec., is investigated. Values of the induced magnetic moment varied in the tests of six pendulums between 100 and 310 e.m.u. per gauss of the inducing field, which ranged between -0.5 and + 0.5 gauss. The maximum magnetic moments induced by tapping the pendulums in the earth's field were of the order of 150 e.m.u. Demagnetization is not easy, and changes in the magnetic moment may easily be caused by small jars in transferring the pendulum from its case. The variation of the period with the magnetic moment is approximately linear. The effects may be largely eliminated by lining the pendulum case with a mu-metal screen, 0.020 cm. thick, which reduces the change in period to about $1 \times 10^{-7}$ sec.--Abstract from Science Abstracts, sec. A, vol. 36, no. 427, 1933, p. 174, signed by E. L. J.

### (1795) DETERMINAZIONI DE GRAVITA RELATIVA ESEQUITE IN SICILIA

### (DETERMINATION OF THE RELATIVE GRAVITY CARRIED OUT IN SICILY)

By Giovanni Guzzo

L'Universo, Florence, vol. 14, no. 11, 1933, pp. 849-860

Gravimetrical observations were carried out during two distinct periods: From May 9 to July 16, 1930 and from September 9 to November 10, 1930. List of stations is given.

The work is discussed under the following headings: Instruments and methods of observation; reduction of the observations; results of observations and their accuracy; values of the acceleration of gravity; calculations concerning the correction for topography.--W. Ayvazoglou.

## (1796) DIE PRAKTISCHE LÖSUNG DER ZWEITEN RANDWERTAUFGABE DER GEODÄSIE

## (THE PRACTICAL SOLUTION OF THE SECOND BOUNDARY-VALUE PROBLEM OF GEODESY)

By F. Hopfner

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 277-285

The method for determining the geoid from the gravity values, as proposed by the author and numerically calculated by F. Ackerl, is developed again from very general viewpoints.--Author's abstract, translated by W. Ayvazoglou.

## (1797) NEUE MESSUNGSERGEBNISSE MIT DEM STATISCHEN SCHWEREMESSER

## (NEW RESULTS OF MEASUREMENTS MADE WITH THE STATICAL GRAVITYMETER)

By H. Haalck

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 285-295

The results of experiments made with the statical gravitymeter on a ship during the trip from Hamburg to Potsdam are discussed. The possibility of registering, on a moving ship, the changes of gravity accurately enough with the aid of the statical gravitymeter was proved. The contact established with more than 14 pendulum stations has shown that the mean error of the statical measurements was equal to about ± 3 milligal. The existence of a local positive gravity disturbance in the region of the "Vierlande" (four countries), south of Hamburg, is, according to the statical measurements, very probable. The measurements made on the ground along the experimental route between Potsdam and Treuenbreitzen, during which the instrument was suspended in an automobile, also resulted in a mean error of the same order after repeated measurements. Based on the results of the experiments, the author draws the conclusion that the barometrical gravitymeter of improved construction must be considered suitable for the general gravimetric surveys on the ground as well as on the sea.--Author's abstract, translated by W. Ayvazoglou.

## (1798) BEITRAG ZUR FRAGE DER TEMPERATURABHÄNGIGEN STÖRUNG DER GLEICHGEWICHTSLAGE DER DREHWAAGENGEHÄNGE

## (CONTRIBUTION TO THE QUESTION OF THE DISTURBANCE IN THE POSITION OF EQUILIBRIUM OF THE SUSPENDED PARTS OF TORSION BALANCES DEPENDING ON TEMPERATURE)

By A. Schleusener

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 301-307

The author shows that, in case of a temperature variation of the outside air only from 6° to 7° C., during continuous registration and simultaneous heating, the position of rest of the Askania balance I-667 changes in 3 hours at 11 divisions of the scale, while that of the Askania balance II only at one division of the scale.

By adjusting the suspended parts into favorable positions the disturbance of the positions of both the suspended parts can for the equal temperature variation practically be eliminated. In this case there is no disturbance, even if the deflections are great. The disturbance is caused, in the opinion of the author, by the convection currents of the air.--Author's abstract, translated by W. Ayvazoglou.

## (1799) ERWIDERUNG AUF DEN AUFSATZ VON R. TOMASCHEK UND W. SCHAFFERNICHT: DIE FLUT DER FESTEN ERDE

## (ANSWER TO R. TOMASCHEK AND W. SCHAFFERNICHT'S ARTICLE: THE TIDE OF THE SOLID EARTH)

By E. Kleinschmidt

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1934,
pp. 308-309

Kleinschmidt discusses here the question on the value of the elevation of the earth's crust caused by tides, as derived by Tomaschek and Schaffernicht in their article, The Tide of the Solid Earth." (See Geophys. Abs. 49, p. 807, and no. 56, pp. 979 and 980.)

A brief remark concerning this question, serving as an answer to Kleinschmidt, is published in the same number of the Zeitschrift für Geophysik, p. 309.--W. Ayvazoglou.

## (1800) DIE MITSCHWINGENSREDUCTION VON PENDELBEOBACHTUNGEN

## (THE REDUCTION OF CO-OSCILLATIONS IN PENDULUM OBSERVATIONS)

By H. Schmehl

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 309-312

This article is written in connection with E. A. Ansel's two works: (1) Das Mitschwingen als Fehlerquelle bei der Reduktion von Pendelbeobachtungen (The Co-Oscillation as a Source of Error in Reduction of Pendulum Observations) published in Gerlands Beiträge zur Geophysik, vol. 25, pp. 36-52, and (2) Erwiderung zu der Arbeit von H. Schmehl (Answer to H. Schmehl's Article) published in Zeitschrift für Geophysik, vol. 9, pp. 261-262.

The translation of Schmehl's abstract reads as follows:

It is proved that the considerations raised by E. A. Ansel with regard to the Furtwangler's instantaneous formula for the reduction of co-oscillations, as well as in his work, Erwiderung zu der Arbeit von H. Schmehl, are not admissible.--W. Ayvazoglou.

## (1801) AUFSUCHEN VERSTECKTER PERIODIZITÄTEN

## (FINDING CONCEALED PERIODICITIES)

By P. Terebesi

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 313-323

As a result of critical estimation of the many methods used for solution of the important task of finding concealed periodicities in a given analysis of functions the author recommends the following method: In the first place to determine the approximate values of the concealed periods by means of the periodogram analysis, using the Mader-Ott harmonic analyser; then to increase the accuracy by separating the single periodic components by means of "Distillation," according to Nicolai Bernstein.--Author's abstract, translated by W. Ayvazoglou.

## (1802) BEMERKUNGEN ZU F. ACKERLS BERECHNUNG DER GEOIDUNDULATION

## (REMARKS CONCERNING F. ACKERL'S CALCULATION OF GEOIDUNDULATIONS)

By Karl Jung

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933, pp. 323-325

The remarks concern Ackerl's article, The Results of the Development of the Gravity Field of the Earth According to the Spherical Functions up to 16th Degree" (see Geophys. Abs. 56, p. 981), published in Zeitschrift für Geophysik, vol. 9, no. 4/5, 1933.

Jung writes: "Owing to an error in the sign in the calculations, and the contradictions of their theoretical foundations with the well-known results of the potential theory, the shape of the geoid can not be determined from the given figures."

F. Ackerl defines his attitude regarding Jung's remarks in a note published on p. 325 of the same number of the Zeitschrift für Geophysik. --W. Ayvazoglou.

## 2. MAGNETIC METHODS

## (1803) MAGNETIC VECTOR STUDY OF KENTUCKY AND SOUTHERN MICHIGAN

By W. P. Jenny

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934, pp. 97-105

The principle of the magnetic vector method is explained briefly.

The salient geological features of Kentucky are investigated as to their regional magnetic effects. It is found that the western and eastern geosynclines show up magnetically as negative anomalies, but that also the Cumberland River arch and the Lexington dome show up as negative anomalies. From this it follows that some outcropping beds in Kentucky are of higher magnetic permeability than the underlying beds and Basement complex.

The study of the magnetic vector map in Michigan reveals a number of magnetic high trends, which are shown to correspond to known structural trends, such as the Howell-Owosso anticline and the Muskegon anticline. The deepest area of the Michigan basin is indicated by a negative magnetic anomaly.

Practical value and application of the magnetic vector maps to field problems is explained by the example of the newly discovered Hart field. Apart from the valuable information obtained by magnetic investigations alone, such investigations are of great help in the interpretation of data gained by other geophysical methods.--Author's abstract.

## (1804) ON A VECTOR-DIAGRAM REPRESENTING THE DIURNAL VARIATION OF HORIZONTAL INTENSITY OF THE EARTH'S MAGNETIC FIELD

By Takematsu Okada

Geophys. Mag., Tokyo, vol. 3, 1930, pp. 1-26

Using magnetic data for 1890 from 14 stations distributed over the world, given in Archiv des Erdmagnetismus, volume 1, 1903, Potsdam, published by Prof. Ad. Schmidt, the author calculated the three harmonic constants of $X = H.\cos D$ and $Y = H.\sin D$ of the horizontal intensity H in the equinoctical months, June and December, for each station, and constructed vector diagrams, using the calculated values for the three components. They are shown in 12 plates. The elements of the vector ellipses, that is, lengths of major and minor axes, the direction of the major axis, hours of maximum variation, and sense of rotation are computed and tabulated. The outstanding results are described. Based on the results obtained, some remarks on the theories of diurnal variations of the earth's magnetic field are given.--W. Ayvazoglou.

## (1805) MEASUREMENT OF PERMEABILITY OF POROUS MEDIA FOR HOMOGENEOUS FLUIDS

By R. D. Wyckoff, H. G. Botset, M. Muskat and D. W. Reed

Review of Scientific Instruments, vol. 4, July 1933, pp. 394-405

A detailed technique is described for measuring the permeability of porous media by the use of either liquids or gases. Derivations are given of the formulas by which the permeability may be computed from the laboratory measurements. In addition to defining a convenient permeability unit, it is proposed to call it the "darcy." Field measurements of the effective permeability of underground sands are discussed, and the appropriate formulas are derived. These include expressions for liquid flow, gas flow, gravity flow and composite artesian and gravity flow. Correction curves are given for application when the wells do not completely penetrate the producing sands.--Authors' abstract.

## (1806) INVESTIGACIONES MAGNETICAS PRELIMINARES EN LOS YACIMIENTOS DE FIERRO DE LAS PAMPAS DE SAN NICOLAS Y MARCONA

## (PRELIMINARY MAGNETIC INVESTIGATIONS ON THE IRON DEPOSITS IN THE PLAINS OF SAN NICOLÁS AND MARCONA)

By G. Meyer

Boletin de la Sociedad Geologica del Peru, Lima, vol. 5, 1933,
pp. 65-66

Preliminary investigations have shown that the magnetic disturbances at San Nicolas and Marcona are due to the hematite-ore deposits. The results of magnetic observations made in these two regions are shown by the isodynamic lines drawn on a map.--W. Ayvazoglou.

## (1807) DIE ENTWICKLUNG DER ERDMAGNETISCHEN FORSCHUNG IN BAYERN

## (THE DEVELOPMENT OF THE EARTH MAGNETIC INVESTIGATION IN BAVARIA)

By F. Burmeister

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 336-341

Earth magnetic observations were started in Bavaria about 100 years ago. At that time the magnetic observatory in Munich was established. Its work to the present is described. A new magnetic observatory in Maisach was established in its place in 1932.--Author's abstract, translated by W. Ayvazoglou.

## (1808) ERDMAGNETISCHE MESSUNGEN MIT HILFE DER DREHWAAGE

## (EARTHMAGNETIC MEASUREMENTS WITH THE TORSION BALANCE)

By A. Berroth and A. Schleusener

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 355-368

A method for measuring the gradients $V_{xz}$ , $V_{yz}$ of the magnetic earth-potential is given; this is a problem which could not be solved successfully so far. Theoretical principles are discussed, some difficulties eliminated and examples of measurements and calculations, by using various balances, carried out.--Authors' abstract, translated by W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1809) SOME PROBLEMS CONCERNING THE PROPAGATION OF THE DISTURBANCES IN AND ON A SEMI-INFINITE ELASTIC SOLID

By Hirosi Nakano

Geophysical Magazine, Tokyo, vol. 2, 1930, pp. 189-348

In this paper Nakano treats, following H. Lamb's method, the propagation of disturbances in and on a semi-infinite elastic solid due to forces applied at the surface, the forces being normal or tangential and distributed in any way though periodic with respect to time.

The general solution of equations of motion of an isotropic, elastic solid in cylindrical coordinates was obtained by K. Terazawa's method for the solution of corresponding statical problems.--W. Ayvazoglou.

### (1810) CONSTRUCTION D'UN SISMOGRAPHE ACCÉLÉROMÉTRIQUE POUR LA COMPOSANTE VERTICALE

(CONSTRUCTION OF A VERTICAL COMPONENT ACCELERATION SEISMOGRAPH)

By Mishio Ishimoto

Bulletin of the Earthquake Research Institute, Tokyo, vol. 11, no. 4, 1933, pp. 717-723

A paper on the construction of a horizontal component acceleration seismograph was published by the author in 1931 (see Geophys. Abs. 32, p. 314)

In the present paper the author describes the construction of a vertical component acceleration seismograph. The mass of the pendulum is equal to 15 kg; the period 0.08 second. A schematic view and a photograph of the apparatus are given.

Various kinds of calibration used for the determination of the main characteristics of the apparatus are described. The records of the vertical oscillations are shown in a picture.--W. Ayvazoglou.

### (1811) EFFECT OF DISCONTINUITY SURFACES UPON WAVE PROPAGATION

By G. Nishimura and K. Kanai

Bulletin of the Earthquake Research Institute, Tokyo, vol. 11, no. 4, 1933, pp. 595-631

This is the continuation of the paper (see Geophys. Abs. 54, p. 930) in which the authors studied the initial motion of the free surface of a stratified semi-infinite solid when a dilatational wave of harmonic type is incident upon the bottom surface of the layer.

In this paper the authors consider the multiple reflections of waves at the free surface and the bottom surface of the layer and study the motion of particles in this stratified semi-infinite solid, when a harmonic train of dilatational waves is obliquely incident upon the bottom surface of the layer.

The mathematical discussion is given and the calculated results are shown in a series of figures.--W. Ayvazoglou.

## (1812) DISCONTINUOUS NATURE OF LOVE WAVES

By J. Coulomb

Comptes rendus de l'Académie des Sciences, Paris, vol. 197, Aug. 21, 1933, pp. 525-528

When the laws of dispersion of Love waves according to his theory are compared with records good results are not obtained. Hence, instead of assuming a continuous train of waves representing a large range of periods, it is necessary to assume a discontinuous train, each member of which has a period nearly that of the stationary periods. The dispersion is then in agreement with observation.--Abstract from Science Abstracts, sec. A, vol. 36, no. 430, 1933, signed by W. A. R.

## (1313) TRAVEL TIME OF EARTHQUAKES (PARTS I AND II)

By K. Wadati, K. Sagisaka and K. Masuda

Geophysical Magazine, Tokyo, vol. 7, April 1933, pp. 87-111

In part I of the paper tables are given of the travel time of near earthquakes having foci of various depths, the calculations being based upon observed data of the North Idu earthquake. Honda, using the Herglotz-Wiechert method, found the velocity of seismic waves to a depth of 300 km. The authors have extrapolated to 500 km, using Honda's results and those of others on distant and deep-focus earthquakes. The table given, strictly, is applicable only for this part of Japan, but the errors in applying it elsewhere are negligible. It is assumed that there is no special discontinuity layer in the crust. The tables are of value in determining accurately the depth of focus, whether the epicentre is known or not.

In part II the arrival times of the P and S waves are investigated and applied to get the position of the epicenter and the focal depth. It is concluded that the velocity ratio of these two waves is approximately constant except for a thin surface layer of the earth's crust. This ratio appears to be closely connected with the Mohorovičić discontinuity. In the upper part of this surface the velocity ratio is about 1.72, while in the lower part and to a depth of several hundred km. it is nearly constant at 1.79.--Abstract from Science Abstracts, vol. 36, no. 428, 1933, p. 846, signed by R. S. R.

## (1814) GRANITE AND LIMESTONE VELOCITY DETERMINATIONS IN ARBUCKLE MOUNTAINS, OKLAHOMA

By B. B. Weatherby, W. T. Born, and
R. L. Harding

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934,
pp. 106-118

Determinations of the velocity of elastic waves in the Tishomingo granite and Arbuckle limestone were made by seismic methods. The measurements on the granite were taken over both long and short spans in the same area, the former including distances of 500 to 2,500 feet, the latter, distances of 5 to 400 f feet. Due to unusual precautions, the short-span data are accurate to 2 percent. The long-span data give a straight-line time-distance graph within observational errors and yield a value of 17,950 feet per second for the longitudinal wave velocity. The data taken over the shorter span show a definite curvature in the time-distance graphs, the longitudinal velocity ranging from 14,880 to 17,150 feet per second and the transverse velocity from 7,000 to 7,950 feet per second. From these data the elastic constants of granite are calculated. Laboratory measurements were made on two small rods of granite from the same locality, by a method giving results accurate to less than 1 percent. The velocities so obtained were somewhat higher. Velocity measurements were made along and across the bedding plane of Arbuckle limestone in a region where the dip of the bed approaches 90°. The velocity along the bedding plane was 17,400 feet per second and across the bedding plane 13,400 feet per second.--Authors' abstract..

## (1815) APPLICATIONS AND LIMITATIONS OF DIP SHOOTING

By E. E. Rosaire and Joseph L. Adler

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934,
pp. 119-132

The history and methods of dip shooting are outlined, and the degree of accuracy obtainable by the method is investigated. Plotting of the misclosures on 151 dip-shooting traverses in the Gulf coast to yield a frequency curve shows a probable error of about 87 feet, in traverses averaging 27,500 feet in length. This error apparently is independent of the length of the traverse, and within the range of spreads commonly used--that is, from 1,400 to 2,400 feet--independent of the spacing of the dip determinations. The smoothness of the frequency curve is broken by an excessive number of misclosures greater than 250 feet. These may be due to unusual structural conditions on the traverses concerned, such as terracing between dip points or faulting, or to gross personal errors. The principal common errors appears to lie in the drafting of the profiles, the determination of the time step-out, and the weathering correction. These errors on individual dips may considerably exceed the probable error, but on traverses of average length will tend to compensate one another. Other sources of error are discussed but are believed to have minor importance.--Authors' abstract.

### (1816) OBSERVACIONES GEOFISICAS Y GEOLOGICAS EN EL DESPOBLADO DE SECHURA

### (GEOPHYSICAL AND GEOLOGICAL OBSERVATIONS IN THE DEPOPULATED REGION OF SECHURA)

By H. Salfeld

Boletin de la Sociedad Geologica del Peru, Lima, vol. 5, 1933,
pp. 67-78

The region of Sechura is covered with Quarternary and Tertiary deposits belonging geologically to the system of the Cordilleran mountain range. Some results of the seismic investigations made this year are discussed.
--W. Ayvazoglou.

### (1817) CONDICIONES GEOLOGICAS Y GEOFISICAS DE LA PROVINCIA DE ICA

### (GEOLOGICAL AND GEOPHYSICAL CONDITIONS IN THE PROVINCE OF ICA)

By H. Salfeld

Boletin de la Sociedad Geologica del Peru, Lima, vol. 5, 1933,
pp. 45-64

Geological conditions of the region between Chincha and Nazca are described (pre-Tertiary layers; Tertiary layers; recent sea-coast terraces; structure of the region west of the Cordilleran mountains). Economic geology of the region is examined. Seismic investigations carried out in the region with diagrams of profiles, are discussed in four annexes to the article.
--W. Ayvazoglou.

### (1818) EINIGE KORRELATIONEN ZWISCHEN SEISMISCHER BODENUNRUHE IN HAMBURG UND DER BRANDUNG IN WEST-UND NORDEUROPA (II)

### (SOME CORRELATIONS BETWEEN THE SEISMIC EARTH DISTURBANCE IN HAMBURG AND THE SURF IN WESTERN AND NORTHERN EUROPE (II)

By E. Tams

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 293-300

In continuation of a previous investigation (see Geophys. Abs. 50, p. 836) the author shows that for a linear single correlation between the mean daily data of the seismic disturbance in Hamburg and that of the surf on the Norwegian coast the correlation coefficient increases up to 0.88 if the distribution of mass, introduced for taking into consideration also the direction of the wind, is corrected. After that, the material is recalculated, based on a linear multiple correlation (in our case, fourfold correlation) going back to the single observations at the fixed dates at $7^h$ and $18^h$ (Greenwich time).

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The net regression-coefficients, the total correlation coefficient espectively the dependance-coefficient, and the partial correlation-oefficients are determined.

This proceeding furnishes new support for the probability that, in greement with Wiechert, there is to a considerable degree, a direct relaion between the surf on the abrupt coasts and the disturbances of the ground.

Even from the correlations of single observations, about 70 percent of he mean square variability of the ground disturbance can be explained by the scillations of the surf.--Author's abstract, translated by W. Ayvazoglou.

## (1819) BEITRÄGE ZUR KENNTNIS DER ERDBEBENKUNDE UND SEISMISCH-AKUSTISCHEN PHÄNOMENE NORD-RHODESIENS

### (CONTRIBUTIONS TO THE KNOWLEDGE OF THE SEISMOLOGY AND THE SEISMIC-ACOUSTICAL PHENOMENA IN NORTH RHODESIA)

By Herbert P. T. Rohleder

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933, pp. 325-332

In this article the author communicates the results of his research on the seismic conditions and especially on the seismic-acoustical phenomena in North Rhodesia during 3½ years. A brief description of the geological structure of North Rhodesia is given in the first part. Earthquakes that occurred from 1906 to 1931 are shown in a graph; the places of earthquakes are indicated in a map.

The acoustic phenomena and their characteristic properties are discussed, and the places where they were observed are mentioned.

The author concludes that the true nature of the underground sounds could not be determined, notwithstanding the fact that a number of these sounds were observed; the sounds were heard without being accompanied by perceptible shocks and were appearing during the dry as well as rainy periods, and at any time during the day and night.

The author expresses the opinion that in general these sounds appeared mostly at the time of extraordinarily stifling heat.--W. Ayvazoglou.

## (1820) MIKROSEISMISCHE BODENUNRUHE UND GEBIRGSBAU (IM WESTLICHEN EUROPA)

## (MICROSEISMIC DISTURBANCE OF THE GROUND AND THE FORMATION OF MOUNTAINS IN WESTERN EUROPE)

By Robert Schwinner

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 332-335

Microseismic disturbances over large areas in Europe are caused mainly by the surfs occurring at the rocky shores; oscillations of the ground caused by surfs at level shores do not propagate very far. That is, only the primitive rocks propagate the oscillations, therefore their formation can be determined, based on the propagation of the disturbance. According to the results obtained by Tams in Hamburg with respect to this phenomenon the connection of mountains between Scotland and Norway, which was so far supposed to exist, cannot be true.--Author's abstract, translated by W. Ayvazoglou.

## (1821) BODEN-UND GEBÄUDESCHWINGUNGEN IN RASTATT NACH DEM ERDBEBEN VOM 8 FEBRUAR 1933

## (OSCILLATIONS OF THE GROUND AND OF THE BUILDINGS IN RASTATT AFTER THE EARTHQUAKE OF FEBRUARY 8, 1933)

By Fr. Gerecke and A. Ramspeck

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 342-350

After the earthquake in Rastatt the magnifying functions for some of the buildings were determined. From these functions conclusions were drawn on the tension caused in these buildings by the earthquake. (See also Geophys. Abs. 50, p. 837.)--Author's abstract, translated by W. Ayvazoglou.

## (1822) BEMERKUNGEN ZUR ANGEWANDTEN SEISMIK

## (REMARKS CONCERNING APPLIED SEISMOLOGY)

By H. Reich

Zeitschrift für Geophysik, Braunschweig, vol. 9, no. 6/8, 1933,
pp. 350-353

The importance of the "Verwitterungsschicht" (weathered layer) in seismology is examined.

In calculating the inclination of the layers the formulas for the "vertical ray" derived in this article may be used with the same success as those given by Schmidt in his example from Venezuela. (See Geophys. Abs. 47, p. 765.)--Author's abstract, translated by W. Ayvazoglou.

In a note published in the same number of the Zeitschrift fur Geophysik, . 354-355, Schmidt gives his viewpoints on the differences in opinion exressed by Reich.

## 4. ELECTRICAL METHODS

### (1823) INTERPRETATION OF ELECTROMAGNETIC SURVEY

By A. Belluigi

Beiträge zur Angewandten Geophysik, Leipzig, vol. 3, no. 4, 1933,
pp. 354-369

The author discusses the problem of deducing from the disturbed electroagnetic field measured at the surface of the earth the configuration of a uried deposit in which a current is caused to flow, causing the measured isturbance. This inverse problem needs certain assumptions for its solution. he geological data must be utilized as a basis, and the author assumed that he current lines diverge from the source equally in all directions, and that section of lines can be considered as independent of the rest of the distriution. On this basis, a solution involving elliptic functions is obtained or the determination of the disturbing effect due to a given body. By anipulating this in the light of the geological data, the inverse problem of etermining the body from the measured disturbance can be solved.--Abstract rom Science Abstracts, sec. A, vol. 36, no. 430, 1933, signed by E. L. J.

### (1824) THEORY OF EARTH CURRENTS

By D. Stenquist

Gerlands Beiträge zur Geophysik, Leipzig, vol. 39, no. 1, 1933,
pp. 100-104

The author refers to charts of the daily variation of the earth current which indicate an anticlockwise flow in middle latitudes commencing about midday. These are compared with charts of the earth's magnetization, and the rotation for each has the same axis and direction. It is shown that the magnetic changes on quiet days are due to variations in the Kennelly-Heaviside layer, but on days of magnetic storms the earth current is the more important. In both cases, however, Ampere's rule is valid and the N pole of the magnetic needle is deflected to the right of a person swimming in the direction of the earth current with face upward.--Abstract from Science Abstracts, vol. 36, no. 428, 1933, p. 847, signed by R. S. R.

## (1825) ELECTRICAL METHODS OF GEOPHYSICAL PROSPECTING

By J. McGarva Bruckshaw

Journal of the Institution of Electrical Engineers, London, vol. 73, no. 443, 1933, pp. 521-541

This paper was read before the meter and instrument section of the Institution on April 7, 1933. An extensive discussion of the paper is added to the article. Bruckshaw's summary of the article reads as follows:

> Geoelectrical methods of prospecting depend on the marked differences in the resistivity which exist between adjacent geological formations, these differences being produced by variations in the porosity of the rocks and in the nature of the saline solutions which they contain. Minerals with a metallic lustre usually have a low resistivity. The variations in resistivity are revealed by the anomalous flow through the ground of an applied current, and the work consists in determining the current flow and interpreting the anomalies in terms of geological structure. The usual methods employed are the surface-potential methods (that is, the resistivity method, equipotential-line methods, and equiquadrature methods, etc.), and the inductive methods at high or low frequencies, in which the current distribution is examined by means of the magnetic field associated with it. The methods may be applied to the location of good-conducting ore bodies, faults, and dykes, to the measurement of depths, and also for the plotting of subsurface contours. Under favorable circumstances sulphide bodies may be detected by the natural currents which they produce (spontaneous-polarization method).

## (1826) EARTH RESISTIVITIES AT DEPTHS LESS THAN ONE HUNDRED FEET

By W. D. Keller

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934, pp. 39-62

Empirical data on the resistivities of different kinds of rocks to depths of 100 feet were obtained under known field conditions. The resistivity-depth relations are plotted in the conventional manner.

A series of graphs shows the resistivity of the rocks along three geologically known sections across the Cap-au-Gres fault in northeast Missouri, the adjacent rocks across the fault surface, being different in each case.--Author's abstract.

### (1827) GRADIENT DE POTENTIAL ELECTRIQUE ET PRESSION ATMOSPHERIQUE

### (ELECTRICAL POTENTIAL GRADIENT AND ATMOSPHERIC PRESSURE)

By R. Guizonnier

Comptes rendus de l'Academie des Sciences, Paris, vol. 197, no. 3, 1933, pp. 265-266

The important relation between the electrical potential gradient and atmospheric pressure is proved by the parallelism in variation of these elements. From the curves representing the measurements made in Val-Joyeux and Batavia it is seen that maxima and minima of the amplitudes of the diurnal component of the potential gradient and of the mean atmospheric pressure were observed at the same epochs.--W. Ayvazoglou.

## 5. RADIOACTIVE METHODS

### (1828) RADIOACTIVITY OF SOIL GASES

By Lynn G. Howell

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934, pp. 63-68

The X-ray activity of the radon in the gases drawn from the soil was measured by means of a Wulf-type electroscope having a 10-liter ionization chamber. The method of making the measurements is described. Indications that a fair sample of gases was obtained at a station were found by repeating measurements at the station on separate days. However, there are some conditions under which repeated measurements may not check. A typical live survey in the Gulf coast region shows large variations are found in a faulted region where there seems to be little hope of correlating the positions of high radioactivity with the positions of the faults; this agrees with the work of Botset and Weaver.--Author's abstract.

### (1829) MESURE DE LA RADIOACTIVITÉ DES EAUX ET DES GAZ NATURELS

### (MEASUREMENT OF THE RADIOACTIVITY OF WATERS AND NATURAL GASES)

By Marcel Geslin and D. Chahnazaroff

Annales Guébhard-Séverine, Neuchâtel, vol. 9, 1933, pp. 312-351

Table of contents:

1. Introduction.
2. Adjustment of the apparatus (Electroscope P. Curie. Model Ch. Chéneveau and A. Laborde).
3. Constants and variables of the electroscope.

4. Corrections to be introduced in calculating the radioactivity (coefficients of the destruction of radon; coefficients of the formation of radon; corrections due to the atmospheric pressure; corrections due to the presence of anhydrous carbon; coefficient of the distribution of radon between the air and the water.

5. Conditions for taking samples (water studied on the spot; water taken for sending it away; samples of spontaneous gas).

6. Laboratory works (apparatus; method of boiling; method of agitating).

7. Calculations (water studied by the method of boiling; water studied by the method of agitating; study of gas; radium contained in a certain water).

Fifteen figures and six tables complete the article.--W. Ayvazoglou.

The investigations published by the authors in this article contain interesting details of the laboratory work in connection with the problem involved.

An English translation of this article would be of great advantage to those not familiar with the French language (Dr. Lee's note).

## 6. GEOTHERMAL METHODS

### (1830) SOME POSSIBLE APPLICATIONS OF GEOTHERMICS TO GEOLOGY

By C. E. van Orstrand

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934, pp. 13-38

The generation and dissipation of heat are important factors in earth history. The present distribution of temperature down to the level of isostatic compensation can probably be determined with more accuracy than has heretofore been obtained by making use of the observations of temperatures in tunnels or across mountain ranges.

Recent geothermal surveys show that relatively high temperatures are generally associated with faults, salt domes, sand lenses, and anticlinal structures of both large and small closure.

Radioactivity and thermal condition through oil-bearing strata are shown to be possible sources of temperature variations.

Generation of heat by the oxidation of petroleum appears to be of minor importance as a heat source. The most potent source of heat is to be found in the hot rocks immediately beneath uplifts.

Geothermal prospecting is a possibility, but as developed at present it is much less efficient than other methods of geophysical prospecting. --Author's abstract.

## 7. UNCLASSIFIED METHODS

### (1831) RELATIONS OF GEOPHYSICS TO GEOLOGY

By Paul Weaver

Bull. Am. Assoc. Petrol. Geol., vol. 18, no. 1, 1934, pp. 3-12

The present aim of geophysical methods is to construct subsurface contour maps. Three principal methods--measurement of gravity, of magnetic field, and of electric field--are forms of measurement of a potential function and consequently have inherent limitations for construction of contour maps.

Another principal geophysical method is the seismic, which does not measure a potential function and is inherently suitable for constructing contour maps.

Both types of methods have difficulties in constructing contours due to variations in physical character of rocks. Suggestions are made for cooperation of geology and geophysics to minimize these difficulties.--Author's abstract.

### (1832) MAGNETIC AND TORSION-BALANCE SURVEY OF MUNICH TERTIARY BASIN, BAVARIA

By Donald C. Barton

Bull. Am. Assoc. Petrol. Geol., Tulsa, vol. 18, no. 1, 1934, pp. 69-96

The Munich Tertiary basin is a structural basin of Tertiary sediments, bounded on the east by the Bohemian crystalline massif, on the north by Mesozoic sediments which dip southward under it, and on the south it has been overridden by the Alpine overthrusts. The whole Bavarian part of the basin has been covered by a close net of lines of observation of the vertical component of magnetism. Two torsion balance lines were run north-south across the basin, and some additional cross lines were run. The geophysical survey indicates: (1) The surface of the crystalline basement dips southwestward across under the Tertiary basin; (2) the Bohemian crystalline massif seems to dip under the Austrian continuation of the Tertiary basin, to connect with the crystalline core of the Austrian Alps; (3) the Bohemian massif seems to have a sharp subsurface scarp on the southward prolongation of the Regensburg fault; (4) the basement under the Tertiary sediments is not the crystalline basement, but presumably the surface of a wedge of Mesozoic rocks; (5) the crystalline core of the Vendelician ridge must be south of the present Munich Tertiary basin; (6) a line of hitherto unsurmised structures with basaltic cores lies along the Danube from Vohburg to Ulm; (7) the cause of most of the residual magnetic anomalies is not clear, but the Passau axis of the maximum seems to reflect structure with the basement; (8) no folding is indicated parallel to the front of the Alps.--Author's abstract.

### (1833) PROSPECCION GEOFISICA EN EL PERU

### (GEOPHYSICAL PROSPECTING IN PERU)

EDITORIAL NOTE

Boletin de la Sociedad Geologica del Peru, Lima, vol. 5, 1933, pp. 43-44

Geophysical prospecting work was started in Peru in 1928. Magnetic and seismic methods were carried on in the Provinces of Ica, Puira, and Lambayeque. The results will be discussed later.--W. Ayvazoglou.

## 9. NEW BOOKS

(1834) Eve, A. S., and Keys, D. A. Applied Geophysics in the Search for Minerals. 2d ed., 1933, 296 pp.; Cambridge University Press, 1933; price 16 s. net.

(1835) Gutenberg, Dr. B. Handbuch der Geophysik (Handbook of Geophysics), vol. 4, part 4. Die zeitliche Folge der Erdbeben und bebenauslösende Ursachen (The Temporal Succession of Earthquakes and the Causes Starting the Earthquakes), by Prof. Dr. V. Conrad, pp. 1007-1202; Berlin, Gebrüder Borntrager, 1932; price 39 gold marks.

## 10. PATENTS

### (1836) METHOD AND APPARATUS FOR DETERMINING UNDERGROUND STRUCTURE

John J. Jakosky, of Los Angeles, Calif.

U. S. Patent 1,906,271 Issued May 2, 1933

This invention relates to the method of determining underground structure which comprises causing electric current to flow in a circuit including an external path insulated from the earth and connected thereto at two separated points and an underground path between said separated points, and measuring by magnetometric means the horizontal component of the magnetic field created by such current flow at a point substantially in the horizontal plane of said external current path.

Claims allowed - 11.

## (1837) ELECTRICAL PROSPECTING

Hans T. F. Lundberg and Folke H. Kihlstedt, Massapequa, N. Y.,
assignors to Swedish American Prospecting Corporation, New York, N. Y.,
a corporation of New York

U. S. Patent 1,934,079 Issued Nov. 7, 1933

This invention relates to a method of electrical prospecting consisting of flooding a profile of a tract under investigation with current supplied from one side of the profile, moving a ground-current-receiving network across the profile and taking readings from point to point, then flooding the profile with current supplied from the opposite side of the profile, and again moving the ground-current-receiving network across the profile and taking readings from point to point.

Claims allowed - 6.

## (1838) METHOD OF AND APPARATUS FOR ELECTRICAL PROSPECTING

Leo J. Peters, Pittsburgh, Pa., assignor to Gulf Production Co.,
Houston, Tex., a corporation of Texas

U. S. Patent 1,938,535 Issued Dec. 5, 1933

This invention relates to the method of electrically determining the character of geologic structure beneath the surface of the earth, which comprises generating an alternating exploring current having a frequency of less than 100 cycles per second, applying said exploring current to the earth in such manner as to set up therein a low-frequency electric or electromagnetic field, deriving a low-frequency current from the earth thus provided with said low-frequency electric or electromagnetic field, translating said earth-derived low-frequency current into current having a frequency greater than 100 cycles per second.and an amplitude proportional to the amplitude of said earth-derived current, rectifying said current of higher frequency and proportional amplitude, and determining the character of said earth-derived low-frequency current by means comprising an indicating device activated by said higher-frequency current after rectification.

Claims allowed - 7.

## (1839) ELECTRICAL PROSPECTING

Theodor Zuschlag, New York, N. Y., assignor to Swedish American Prospecting Corporation, New York, N. Y., a corporation of New York

U. S. Patent, 1,940,340 Issued Dec. 19, 1933

This invention relates to a method of electrical prospecting which comprises setting up an electric ground field in a tract to be investigated, producing a current flow in two parallel circuits, each of which has at least one variable resistance by the ground field intensities of different portions of said tract, setting the variable resistance of one of said circuits at an arbitrary value, balancing the circuits by suitable adjusting the variable resistance in the other circuit until the same current flows through both circuits, noting the values of the variable resistances, altering the variable resistance of one of said circuits to another arbitrary value to produce a different current flow there through, again balancing said two circuits by suitably adjusting the variable resistance in the other circuit until the same current flows through both circuits, and noting the new values of the variable resistances.

Claims allowed - 12.

## (1840) METHOD OF CREATING ARTIFICIAL SEISMIC WAVES

Oscar E. Dudley and Con Lucid, Houston, Tex., assignors to The Texas Company, New York, N. Y., a corporation of Delaware

U. S. Patent 1,943,725 Issued Jan. 16, 1934

This invention relates to a method of creating artificial, compressional earth waves which comprises firing an explosive charge in the ground at a depth of more than 50 feet in a tightly packed hole, this charge being insufficient to disrupt the surface of the earth from said depth, so that substantially the entire force of the explosion will be transmitted to the earth.

Claims allowed - 3.

## (1841) MAGNETOMETER

Orley H. Truman, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware

U. S. Patent 1,943,850 Issued Jan. 16, 1934

This invention relates to the combination, in a magnetometer, of a magnet or magnets mounted on an elastic support, means for adjusting the equilibrium position on this support, means for causing the equilibrium to be stable on both sides of this position, means for altering the restoring force so as to vary the period of vibration about this position, means for damping this vibration, a mirror elastically connected to the magnet or magnets so as to amplify the extent of angular motion, and means for reading the deflection of the mirror.

Claims allowed - 14.

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G.A. No. 60

UNITED STATES BUREAU OF MINES
Scott Turner, Director

April, 1934

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# GEOPHYSICAL ABSTRACTS
# MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

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## 1. GRAVITATIONAL METHODS

### (1842) PENDELMESSUNGEN ZU ZWECKEN DER PRAKTISCHEN GEOLOGIE IM NORDDEUTSCHEN FLACHLANDE

### (PENDULUM MEASUREMENTS FOR PURPOSES OF APPLIED GEOLOGY IN THE NORTH GERMAN PLAIN)

By G. Brinckmeier

Petroleum Zeitschrift, Berlin, vol. 30, no. 1, 1934, pp. 1-6

Brinckmeier discusses the fitness of the pendulum method for obtaining true information on the structure of the subsoil and the question of using other methods to complete the information obtained by the pendulum measurements. Maps of the following regions, the tectonic conditions of which are well-known and for which a sufficient number of pendulum observations is available, are given: (1) Gravity conditions north and east of the Ostharz; (2) distribution of the gravity and of the vertical intensity at the northwestern border of the Flechtinger Mountains range; (3) distribution of the gravity and of the vertical intensity east of the Harz; and (4) distribution of the gravity and of the vertical intensity in the Prignitz.

Summing up his investigations, the author says that pendulum measurements alone are not sufficient for obtaining a clear picture on the structure of the subsoil in the northern German plain, necessary for the purposes of the applied geology. Regions with gravity surplus do not correspond always to the accumulation of masses. Even a minimum gravity sometimes is observed above large tectonic masses, as, for example, in the region of Delitzsch-Eilenburg.

This phenomenon is explained by the fact that the pendulum is less affected by masses distributed on the surface of the earth or at accessible depths than by masses at very great depths, perhaps even below the solid earth's crust.

Owing to the fact that the magnetic effects are produced from much higher levels it can be easily explained while observations on the distribution of gravity do not always agree with those showing the distribution of the magnetic forces. Therefore pendulum measurements must in many cases be supplemented by other methods. Of course, the author limits the validity of his conclusions to the north German plain only, as, under other conditions, a picture of the structure of the subsoil sufficiently true for practical purposes may be obtained by using the pendulum method.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (1843) TERRESTRIAL MAGNETISM - THE MAGNETIC VARIATIONS OF SHORT DURATION

By A. H. R. Goldie

Quarterly Journal of the Royal Meteorological Society, London, vol. 59, no. 248, 1933, pp. 3-15

The present article deals with magnetic variations of short duration. The author summarizes facts of observations and mentions some of the interpretations attached to these facts and to the theories put forward to account for them.

List of references is added.—W. Ayvazoglou.

### (1844) DIE AUSSICHTEN DES AUFFINDENS VON ERDÖL IM SUBHERZYNEN BECKEN UNTER BERÜCKSICHTIGUNG DER LAGERUNGSVERHÄLTNISSE DES TIEFEREN UNTERGRUNDES

### (PROSPECTS CONCERNING THE FINDING OF OIL IN THE "SUBHERZYNE BECKEN" TAKING INTO CONSIDERATION THE STRUCTURAL CONDITIONS AT GREAT DEPTHS)

By O. Keunecke

Kali, Berlin, vol. 27, 1933, no. 23, pp. 289-291 and no. 24, pp. 303-304

The existence of anticlines in the "Subherzyne Becken" in North Germany makes this region of special interest in prospecting for oil. A brief geological description of the area is given. Important indications of the presence of oil observed in several places, especially on the southern border of the Hakelwald, near Schadeleben, are mentioned. Owing to the fact that structural features, such as faults, fissures, etc., are known to be the main conditions necessary for the accumulation of oil the location of these structural features becomes very important. They can be discovered the best by geophysical methods of prospecting.

The results of the magnetic measurements carried out by the author in the summer of 1931 in the region of the Subherzyne Becken and its northwestern extension are described, and the remarkable course of the isanomalies is shown in a map.

The conclusions drawn by Keunecke from these measurements are discussed, and the great importance of geophysical investigations for the future exploration of oil in this region is emphasized.

Locations of special interest are examined.—W. Ayvazoglou.

## (1845) RESULTS OBTAINED BY THE MAGNETIC PROSPECTING AT THE KAMAISHI IRON MINE

By Yoshizo Fujita

Memoirs of the College of Engineering, Kyoto Imperial University, vol. 5, no. 3, 1927, pp. 133-151

A brief description of the apparatus used (Thalen-Tiberg magnetometer) and its testing and adjusting is given. The characteristic features of the prospected areas and the records obtained from the experiments are stated.

The results obtained from the geological survey agreed with the information obtained from the magnetic survey.

The following maps are added: (1) Topographical and geological map of the prospected areas of the Kamaishi mine; (2) isoclinic chart of the prospected areas; (3) horizontal intensity chart of the prospected areas; (4) map showing the relation between the isoclinic curves and the underground workings in the Shinyama deposit.—W. Ayvazoglou.

## (1846) WEST WITWATERSRAND AREAS

(Editorial Note)

The Mining and Industrial Magazine, Johannesburg, vol. 17, no. 10, 1934, p. 434.

The results of diamond drilling to date confirm almost accurately the correctness of the earlier magnetometric survey work. In borehole no. 11 on Venterspost farm, so far as the thickness of dolomite and Ventersdorp lava and depths to major reefs and to the underlying Jeppestown shale are concerned, the results confirm the estimates made. In borehole E. 4 on farm Driefontein no. 118, the drilling so far accomplished bears out accurately what was expected to be found.—W. Ayvazoglou.

## (1847) A MAGNETIC GRADIOMETER

By Irwin Roman and Thomas C. Sermon

American Institute of Mining and Metallurgical Engineers, New York, Tech. Pub. 542, 1934, 17 pp.

In this paper a magnetic gradiometer has been described for determining the space rate at which the earth's magnetic field is changing. This instrument consists of two similar coils rotating around parallel shafts in such a manner that the planes of the coils always remain parallel. Since the electromotive force induced in a coil is proportional to the field in which the coil rotates the ratio of the fields at the two coils may be measured by the ratio of the two electromotive forces. This ratio is measured by a specially devised Kirchhoff net.

To test the method a preliminary instrument was built and proved by actual ests to check the theory beyond expectations. Examples of the field tests ave been included as indicative of what may be done.

Some of the problems of design have been discussed with reference to uilding an improved gradiometer as soon as conditions permit.--Authors' bstract.

## 3. SEISMIC METHODS

### (1848) YOUNG'S MODULUS AND POISSON'S RATIO WITH REFERENCE TO GEOPHYSICAL APPLICATIONS

By W. A. Zisman

Proceedings of the National Academy of Sciences, Washington, vol. 19, no. 7, 1933, pp. 653-665

Measurements of the elasticity modulus E and of the Poisson ratio $\sigma$ ere carried out by using pressures up to several hundreds kg/mm$^2$. The pparatus is described, and the results are given in tables and graphs. The ocks studied in the experiments are described.--W. Ayvazoglou.

### (1849) COMPRESSIBILITY AND ANISOTROPY OF ROCKS AT AND NEAR THE EARTH'S SURFACE

By W. A. Zisman

Proceedings of the National Academy of Sciences, Washington, D. C., vol. 19, no. 7, 1933, pp. 666-679

The compressibilities of a number of rocks of geophysical interest have een measured at 30° C. for pressures up to 840 kg/cm.$^2$ The prediction of dams and Williamson of a rapid rise in compressibility as the pressure is ecreased has been verified. It is a remarkable effect in the case of covered ocks, and a very much smaller one for uncovered rocks. The variation of the ompressibility with pressure is greater for the more porous rocks. Thus, in rder of decreasing magnitude of this effect, we have marble, granite, limestone, Sudbury norite, and Vinal Haven diabase. The compressibility of the ncovered rock is always found to be less than that of the same rock when covered. At pressures up to 300 kg/cm.$^2$ the difference may be large but apidly approaches zero at higher pressures.

In many cases the difference is already unimportant at 840 kg/cm.$^2$ Simple explanations of these pressure effects can be given, based upon the existence of many easily compressed cracks and cavities between mineral grains. The linear compressibility often shows a large variation with direction in the rock; it is naturally most striking in layered or bedded rocks.--Author's abstract.

## (1850) COMPARISON OF THE STATICALLY AND SEISMOLOGICALLY DETERMINED ELASTIC CONSTANTS OF ROCKS

By W. A. Zisman

Proceedings of the National Academy of Sciences, Washington,
vol. 19, no. 7, 1933, pp. 680-686

Summarizing the results of static measurements of $E$ and $\sigma$ for granite by the comparison of field and laboratory work the author suggests the following generalizations: The statically determined elastic constants $E$ and $\sigma$ are smaller than the respective seismological or dynamic values; the compressibility of uncovered rocks is essentially the same as the seismically effective compressibility; the more compact the rock the more nearly do the static and dynamic constants agree, and the nearer together are the respective compressibilities of covered and uncovered specimens.--W. Ayvazoglou.

## (1851) ON THE ARTIFICIAL VIBRATIONS OF GROUND

By S. K. Banerji and M. D. Manohar

Indian Journal of Physics, Calcutta, vol. 8, part 2, 1933, pp. 95-121

Contents:

1. Introduction
2. Experimental arrangement for recording artificial vibrations of ground: (a) seismographs; (b) other types of recorders.
3. Horizontal and vertical seismographs used for recording artificial vibrations.
4. Discussion of the records obtained.
5. Lamb's theory.
6. Variation of amplitude of vibrations with distance.
7. Observed and calculated periods of vibrations.
8. Free vibrations of ground and buildings.
9. Ratio of horizontal to vertical displacements - observed and calculated.

Authors' summary reads as follows:

When we drop a known weight from a known height we communicate a definite energy into the ground. We can calculate the vibrations produced in the round (assumed to be isotropic) by an impulse of this kind and compare them ith the observed results. The ground movements at various distances from he source of disturbance were recorded by two horizontal component (N-S and -W) seismographs of the Milne-Shaw type (period 12 seconds, damping ratio 0:1) and a vertical component seismograph (period 3 second), all locally contructed. All three components were recorded on the same sheet of photoraphic paper kept moving quickly by clockwork. The movement in all three omponents begins with a sudden impulse and is followed by oscillations having ompound periods composed of the free periods of the small building in which he instruments are housed and the forced periods of the ground due to the ropping of the weight. The amplitude of the horizontal component of the round movement is found to decrease with distance approximately according to he theoretical law (distance) $^{-\frac{1}{2}}$. The periods of the forced movement of the rounds depend on the duration of impact and the elastic constants of the round, and the theoretical values agree fairly closely with the observed alues. When a weight of 120 kilograms meets the ground with a velocity of 4 eters/second the amplitude of the horizontal component of the ground moveent at Colaba is about 12 $\mu$ at a distance of 10 meters and 5 $\mu$ at 20 meters nd the period of the forced vibrations is about 0.05 second. The free period f the building is of the order 0.014 second.

## (1852) APPARENT VELOCITY OF PROPAGATION OF SUPERFICIAL EARTH TREMORS

By C. Alessandri

Accademia Nazionale dei Lincei, Rome, vol. 17, Jan. 22, 1933,
pp. 141-146

The problem of the depth of seismic hypocenters is in an unsatisfactory condition; the data lack precision. But there is one feature which is precise, the apparent resultant velocity of propagation from place to place along the earth's surface. The author investigates how to compute the hypocentric depth from these data.

Abstract from Science Abstracts, no. 426, 1933, p. 506, signed A.D.

## (1853) ERSCHÜTTERUNGSMESSUNGEN AUF DER FUCHSGRUBE DER NIEDERSCHLESISCHEN BERGBAU-AKTIENGESELLSCHAFT IN WALDENBURG, SCHLESIEN

## (MEASUREMENTS OF TREMORS IN THE FUCHS-MINE OF THE LOWER SILESIAN MINING COMPANY IN WALDENBURG, SILESIA)

By Heinrich

Zeitschrift fur Berg-Hütten-und Salinenwesen im Preussichen Staate, Berlin,
vol. 81, no. 6, 1933, pp. B 347-354

The velocity of propagation of waves in coal and in adjacent rocks is determined. The lengths of the waves for various velocities of propagation are calculated from the periods shown in the seismograms. Conclusions on the absorption of the elastic waves propagating in coal and rock are drawn from the amplitudes of seismograms produced by explosions of equal charges. It is shown that the absorption of waves caused by explosions is much greater than the absorption of the elastic waves produced in the ground by the oscillations of machines. The amplitude values of the earth waves measured were maximum 2/1000 millimeter.

Very strong energy-jumps occur during the transition of the elastic waves into another layer; this results in the fact that after a manifold change only a fraction of the energy expected in case of a normal absorption remains.

Bending oscillations of an unsupported hanging wall were not established with certainty.--Author's abstract, translated by W. Ayvazoglou.

### (1854) THE SEISMIC RECEIVER

By F. W. Sohon

Journal of the Washington Academy of Sciences, Menasha,
vol. 23, no. 9, 1933, pp. 409-413

Compares the seismic receiver and the radio receiver. The resemblance between a seismograph and a radio set, which extends even to the defects, is discussed.--W. Ayvazoglou.

## 4. ELECTRICAL METHODS

### (1855) ZUR MESSUNG DER ELEKTRISCHEN LEITFÄHIGKEIT EINES UNENDLICHEN HALBRAUMES DURCH INDUKTION

### (ON THE MEASUREMENT OF THE ELECTRICAL CONDUCTIVITY OF AN INFINITE SEMISPACE BY INDUCTION)

By J. Koenigsberger

Physikalische Zeitschrift, Leipzig, vol. 35, no. 1, 1933, pp. 6 - 8

Previous calculations on the magnetic field produced by induced currents in an infinite semispace, with the conductivity equal to *K* in the center of an induced circular current situated on the surface of the semispace, are supplemented by complete integration of the formula for the field of this primary circular current with radius *R*. (See Geophys. Abs. 20, p. 12).

The numerical factor determined previously becomes 1.5 percent smaller. In connection with this, the corrective formula for the finite lateral extension of the hollow space is given.

Formulas derived by neglecting the skin effect are examined by various ays; they agree, for low frequencies, with the results of experiments within he allowed limits of the errors.--Author's abstract, translated by W. yvazoglou.

## (1856) DAS MAGNETISCHE FELD DER VON EINEM KREISSTROM IN FLÄCHENHAFTEN LEITERN INDUZIERTEN STRÖME

## (THE MAGNETIC FIELD OF CURRENTS INDUCED IN PLANE-SHAPED CONDUCTORS BY A CIRCULAR CIRCUIT)

By W. Nunier

Physikalische Zeitschrift, Leipzig, vol. 35, no. 1, 1934, pp. 8 - 15

To make experimental tests possible, F. Ollendorf's calculations of the agnetic field induced in thin plates by circular circuits are developed and specialized.

The results of the experiments, discussed in the second part of this rticle, agree well with the theoretical deductions.--Author's abstract, translated by W. Ayvazoglou.

## (1857) A CONTRIBUTION TO THE THEORY OF THE INTERPRETATION OF RESISTIVITY MEASUREMENTS OBTAINED FROM SURFACE POTENTIAL OBSERVATIONS

By R. J. Watson

American Institute of Mining and Metallurgical Engineers, New York,
Tech. Pub. 518, 1934, 34 pp.

The mathematical theory is considered for several configurations of electrodes when the underground is either homogeneous or composed of parallel, homogeneous, and isotropic layers of differing resistivity. Following this, the method of calculating theoretical resistivity curves by the method of Ehrenburg and Watson is reviewed. The results of such calculations for 49 cases are given in the form of resistivity curves. Forty-one of these curves are for 3-layer problems, and the remaining 3 for 4-layer problems. The 3-layer curves cover sufficiently varied conditions to make them useful for general interpretation purposes for cases where the bottom layer can be considered a perfect resistor. The 4-layer curves are published chiefly to show the possibility of error when an empirical rule is used for depth determination. The results of 14 model experiments are given to check the mathematical development. These comprise models for 2, 3, and 4 layers, in all of which the lowest layer is a perfect resistor. These results confirm the mathematical theory.--Author's abstract.

## (1858) DIFFERENTIAL RATE OF CHANGE METHOD, ELIMINATION OF SURFACE RESISTIVITY VARIATIONS IN ELECTRICAL PROSPECTING

By H. Lundberg and F. Kihlstedt

American Institute of Mining and Metallurgical Engineers, Adv. Paper, Feb. 15, 1932, 4 pp.

An abstract published in the Annotated Bibliography of Economic Geology, vol. 6, no. 1, 1934, signed by D. W., reads as follows:

> The paper gives examples illustrating the potentialities of the Racom potential-drop-ratio method for locating quartz veins, sulphide orebodies, and also the determination of the depth to formation boundaries.
>
> The method permits the measurement of very small differences in resistivity such as may be caused by the above features. The authors have developed the rate of change method which makes it possible to distinguish between resistivity variations due to near surface causes and those due to deep seated causes such as orebodies and entirely eliminate the former.

## (1859) INSTRUMENT FOR BETTER RESISTIVITY WORK

(Editorial Note)

Engineering and Mining Journal, New York, vol. 135, no. 1, 1934, p. 46

A new electrical geophysical instrument invented by Theodor Zuschlag, called a "ground comparator", is mentioned in this note; the apparatus is not described. The increased sensitivity claimed for the comparator permits differentiating geological formations whose resistivities are not widely different, thereby greatly broadening the field of electrical prospecting.

According to this note, Sherwin F. Kelly recently used the comparator in making an electrical survey of salt deposits near Syracuse, N. Y.--W. Ayvazoglou.

## (1860) SOME INTERPRETATIONS OF EARTH-RESISTIVITY DATA

By Irwin Roman

American Institute of Mining and Metallurgical Engineers, New York, Contrib. 66, 1934, 15 pp.

In the present paper a method of superposing the observed apparent earth resistivities on a set of standard reference curves has been explained and illustrated by actual resistivity survey results. Tagg's method has also been applied to the same data. Either method is a serviceable tool in the interpretation of earth-resistivity data where observations justify the ssumption of a single homogeneous overburden of uniform thickness overlying n infinite homogeneous bed. In this sense the term "homogeneous" applies to he region as a whole and not to small-scale sections. In particular, the verage resistivity may not be the actual resistivity at any point of the egion and therefore cannot be determined by sampling. Thus, a mixture of and, glacial drift, boulders, and humus may be considered as homogeneous if he mixture is uniform for the purposes of the survey.

Tables have been included to make possible rapid determination of the pparent resistivity for a specified set of conditions when the measuring onfiguration is that of the Wenner four-electrode system and the geologic ormations permit the assumption of the simple case.

Experience has shown that the method of Tagg and that of superposition re valuable partners. Used together, each checks the other. The two methods re considered in the aspects of speed, overburden resistivity, uniqueness, hecking and revaluation, and reliability.--Author's abstract.

## (1861) VARIATIONS IN POTENTIAL GRADIENT CAUSED BY SOME METEOROLOGICAL PHENOMENA

By J. M. Sil

Quarterly Journal of the Royal Meteorological Society, London, vol. 59, no. 248, 1933, pp. 23 - 24

The author used a Cambridge electrograph installed in the Poona Observatory with a view to studying the relations between the earth's field and meteorological phenomena, such as: (1) Strong insolation; (2) strong wind on a dry, hot day; (3) sea breeze; (4) dust storm; (5) haze, fog, and inversion; and (6) cumulus cloud forming overhead. Photographic records of potential gradient obtained with the electrograph are given.--W. Ayvazoglou.

## (1862) ELECTRICAL EXPLORATION OF WATER-COVERED AREAS

By C. and M. Schlumberger and E. G. Leonardon

American Institute of Mining and Metallurgical Engineers, New York, Contrib. 71, March 1934, 13 pp.

In this article the authors describe the adaptation of electrical resistivity measurements to the particular case of exploration in which the surface is an expanse of water (river, lake, sea).

The two fundamental techniques of the field application of the resistivity measurements--(1) horizontal exploration or resistivity-map method and (2) vertical-exploration or "vertical-sounding" method--are called, and the new procedure in applying them over an expanse of water is discussed. The following practical cases are examined:

1. Tectonic exploration in French equatorial area,
2. Stratigraphic study in Caspian Sea, near Bibi Eibat,
3. Study of rock conditions in Algiers Harbor.

## 5. RADIOACTIVE METHODS

### (1863) THE AMPLIFICATION AND RECORDING OF RAPID GEIGER-MÜLLER COUNTERIMPULSES

By Gordon L. Locher

Journal of the Franklin Institute, Philadelphia, vol. 216, no. 5, 1933, pp. 553-558

In this article Locher describes the development of an amplifier of very high sensitivity for dealing with very feeble counterimpulses and of a recording apparatus for impulses at rapid rates in the application of Geiger-Muller counters for measurements. According to the author, these requirements are met by a circuit which provides as much amplification as is consistent with the demands of stability and allows the recording of impulses at rates of about 1,400 per second, which is about 10 times as fast as they are generated in any Geiger-Müller counter so far described in print. The scheme of the circuit is shown in a figure.--W. Ayvazoglou.

### (1864) A MORE SENSITIVE DESIGN OF THE GEIGER-MÜLLER COUNTER

By Trevor R. Cuykendall

The Review of Scientific Instruments, Lancaster, vol. 4, no. 12, 1933, pp. 676-678

Cuykendall describes a new "vane-type" counter designed by him. The preliminary investigation indicates, according to the author, that the sensitivity of a Geiger-Müller counter for gamma rays and hard X rays can be increased from 2 to 3 times, or perhaps more, by the introduction into the counter of suitably disposed vanes, the effect of which appears to be to increase the effective surface from which the active recoil electrons or photoelectrones come.--W. Ayvazoglou.

### (1865) THE RADIOACTIVE RADIATION FROM THE SURFACES OF SOLIDS AND THE MEASUREMENT OF THE THORIUM CONTENT OF ROCKS

By Robley D. Evans

The Physical Review, Lancaster, vol. 45, no. 1, 1934, pp. 38-42.

Ordinary granite, containing about 3 x 10 $^{-6}$ g U per g and about 6 x 10$^{-6}$ g Th per g of rock, will support an ionization current of about

$10^{-15}$ ampere per 100 $cm^2$ of polished rock surface. About 90 percent of this ionization is due to alpha rays from the rock, and about 10 percent to beta rays. From hand specimens the gamma radiation is too feeble to operate an ionization chamber but can be measured with a Geiger-Müller tube counter. Observations of the surface ionization due to alpha rays or of the gamma ray activity with the tube counter represent the combined effect of the uranium, actinium, and thorium series. They can be corrected for the effects of the uranium and actinium series by employing emanation measurements; thus the thorium content of ordinary rocks may be ascertained. Important applications lie in the field of geophysics and in certain cosmic ray problems.--Author's abstract.

## (1866) RADIOAKTIVE HEILQUELLEN IN DEUTSCHLAND

## (RADIOACTIVE MINERAL SPRINGS IN GERMANY)

By Gensar

Zeitschrift der deutschen geologischen Gesellschaft, Berlin,
vol. 85, no. 7, 1933, pp. 482-495

Germany is the richest country in radioactive springs. The most important locations are mentioned.--W. Ayvazoglou.

## (1867) TO THE QUESTION OF THE EMANATION METHOD OF SEARCHING FOR RADIOACTIVE OBJECTS

By A. Kirikov, P. Tverskoi, and A. Grammakov

Bulletin of the United Geological and Prospecting Service of the U.S.S.R.,
vol. 51, no. 84, 1932, pp. 1269-1282

To increase the depth penetration of radioactive methods over that attainable by the alpha- and gamma-ray methods the authors have attempted to apply the emanation method. Studies were made of the distribution of the radium emanation in horizontal and vertical directions. Photographic registration and observations in various depths were applied.--C. A. Heiland's abstract in The Mines Magazine, vol. 23, no. 11, 1933, p. 13.

# 6. GEOTHERMAL METHODS

## (1868) PROPRIÉTÉS THERMOMAGNÉTIQUES DES ROCHES VOLCANIQUES

## (THERMOMAGNETIC PROPERTIES OF VOLCANIC ROCKS)

By Raymond Chevallier and Jean Pierre

Annales de physique, Paris, vol. 18, December 1932, pp. 383-477

The purpose of the present paper is to study the thermomagnetic properties of volcanic rocks, especially in regard to determining the nature of their ferromagnetic elements.

After a brief review of the advantages and disadvantages of the various methods used the authors explain the facts, based on the documents available.

The apparatus used by the authors and the principles of their method of investigation are described. A theoretical outline on the interpretation of the recorded curves is given. The curves obtained for lavas are classified, and the fact that the Curie points obtained cover the whole scale of temperatures from 580° down to 0° C. and probably much lower is established. This continuity requires the magnetic elements to be of the nature of a solid solution.

The connection between the Curie points and the constitution of rocks is shown.

In the opinion of the authors the statements discussed in this paper firmly establish the nature of the solid solution of the magnetic elements of volcanic rocks, as well as the fact that a quantitative determination of Curie points is possible from the knowledge of the solid solutions in ferric oxides.--W. Ayvazoglou.

## 7. UNCLASSIFIED METHODS

### (1869) GEOPHYSICAL EXAMINATION OF PROSPECTS

By J. J. Jakosky

Canadian Mining Journal, Gardenvale, vol. 55, no. 1, 1934, pp. 9 - 13.

Geophysics is of most value in the initial evaluation of a prospect since it is a means of rapidly and inexpensively obtaining comprehensive information regarding subsurface conditions.

Usual methods of evaluating a prospect: (1) The examination of all present openings, such as tunnels, shafts, etc.; (2) study of the geology of the district; (3) a careful review of the history of the district, with reference to the past production and the factors which caused a cessation of this production.

Economics of geophysical work: From the economic viewpoint geophysics should be considered a means of effecting a saving in the exploration or development cost of the project. Costs of drilling and geophysical exploration are compared.

Finding a likely prospect: For obtaining commercially valuable prospects the author recommends disregarding all areas which do not have especially large, definite indications of ore. When the studies on a property indicate the possibility of a commercial ore body, it is then necessary to carry out some form of actual exploration work. A practical case of a prospect in Sonora, Mexico is described.

Extension and depths of ore bodies: Evaluation of a prospect must also take into account the possibility of later development in uncovering the ore. A typical example of electrical prospecting for ore is examined.

Equipment used: A view of the truck, with complete equipment for conducting the work described in this article, is shown in a figure.

Economic considerations: The author concludes that economic advantages secured by intelligent employment of geophysical and associated geological studies will do much to improve efficiency, and to lower attendant risks in the initiation of new mining ventures.--W. Ayvazoglou.

## (1870) THE NORTH GERMAN SALT-DOME MAP

By J. Brian Eby

Oil Weekly, Houston, vol. 72, no. 8, 1934, pp. 12-20

The map of the north German salt-dome basin which accompanies this article was compiled in Hannover in the summer of 1933. While nearly 100 domes and structures are listed, 20 to 30 newly discovered geophysical domes are not indicated. These discoveries lie chiefly in northern Oldenburg and Hannover Provinces. The majority are torsion-balance discoveries checked by refraction shooting. Reflections have only recently been used and are not as yet successfully established.

An alphabetical list of German domes and structures with a few facts about each is added.--W. Ayvazoglou.

## (1871) THE MUNICH TERTIARY BASIN OF SOUTHERN BAVARIA

By Donald C. Barton

The Oil News, Houston, vol. 72, no. 9, 1934, pp. 16-22

This paper is taken largely from two parallel papers: D. C. Barton, Magnetic Torsion-Balance Survey of the Munich Tertiary Basin, Bavaria, Bull. Assoc. Petrol. Geol., vol. 8, no. 1, 1934, (see Geophys. Abs. 59); and Barton, Gundermann, and Thomas, Magnetic Torsion-Balance Survey of the Munich Tertiary Basin, Bavaria, to be published in Abhandlungen der bayerischen geologischen Landesanstalt.

A combined magnetic torsion-balance survey of the Munich Basin was made with the purpose of: (a) Determining, if possible, the presence of petroliferous types of structure; (b) the depth, dip and general conformation of the basements under the Tertiaries; and the relations of the Tertiaries to the adjacent Mesozoic formations to the north and to the crystallines to the northeast.

The torsion-balance survey comprised 1,195 reconnaissance stations and 366 detail stations.

The magnetic survey comprised 14,743 stations with a Schmidt-Lloyd vertical variometer and is one of the most detailed magnetic surveys ever made. The results of the survey are given in two maps (map of isogams of vertical magnetic intensity and map of gravity isogams from results of torsion balance survey), which show respectively the relative variation of gravity and of the vertical components of terrestrial magnetism, corrected for the normal variation with latitude.

In the concluding paragraph the author says:

> The presence of folding in front of and parallel to the edge of the Alps is not indicated or suggested by the results of the torsion balance and magnetic surveys, although there is suggestion of faulting. The failure of both the magnetic and torsion balance surveys to indicate or suggest the presence of such folding is not conclusive proof of its absence. It is conceivable that there is no vertical variation of magnetic permeability. Such folding, therefore, would produce no magnetic anomalies. The absence of any vertical variation of density is possible but increase of compaction, and therefore of density, with depth if probable. The increase of density with depth, however, might be so slight that the folding would produce very faint anomalies. The close spacing of the torsion balance stations was used so that faint anomalies might possibly be detected. The writer was unable to recognize any anomalies which he would interpret as indicating such folding. The absence of indication or suggestion of the folding by the results of the geophysical surveys is evidence, therefore, although not finally conclusive evidence, that folds of moderate or large size and amplitude are not present in front of the Alpine overthrusts.--W. Ayvazoglou.

## (1672) FUTURE ORE SUPPLY AND GEOPHYSICAL PROSPECTING

By M. King Hubbert

Engineering and Mining Journal, New York, vol. 135, no. 1, 1934, pp. 18-21

After a brief introduction on the importance of mining in general and on mineral distribution in the earth's crust the author states that, owing to the fact that most of the possible discoveries by surface methods are already made, the domain of geophysical prospecting becomes of special value at present.

The major possible applications of geophysical methods appear, according to Hubbert, to have been already tried sufficiently to indicate that in the future no departure from magnetic, electrical, and seismic fields, as the most productive of the domains of geophysical prospecting, is likely to occur. Apparatus is being improved, and computing methods are becoming more simple and graphic. The mineral industries are now entering the geophysical epoch of prospecting.--W. Ayvazoglou.

## (1873) GEOPHYSICS IN THE OIL INDUSTRY

By Everette de Golyer

Mining and Metallurgy, New York, vol. 15, no. 325, 1934, pp. 21-22

This is a brief report on geophysical surveys carried out in the oil industry of the United States during 1933. The area of the greatest activity was the Gulf coastal plain of Texas and Louisiana.

Seismic and gravitational methods were mostly used. Magnetic surveys were made on a much smaller scale than in previous years. Electrical coring has been used more than at any previous time.--W. Ayvazoglou.

## (1874) GEOPHYSICS IN THE METALLIC AND NONMETALLIC FIELDS

By Sherwin F. Kelly

Mining and Metallurgy, New York, vol. 15, no. 325, 1934, pp. 37-38

In this article Kelly briefly reviews geophysical activity in various parts of the United States and abroad during 1933. According to Heiland's report, mentioned by Kelly, there was little geophysical activity in mining, but a total of 127 crews have been employed in this country the last half year on oil work. Of these 66 were working reflection seismic methods, 34 the torsion balance, 17 were using magnetometers, 6 employed pendulums or similar instruments, and 4 were engaged in electrical work.--W. Ayvazoglou.

## (1875) MEASUREMENT OF PERMEABILITY OF POROUS MEDIA

By R. D. Wyckoff, H. G. Botset, M. Muskat, and D. W. Reed

Bulletin of the American Association of Petroleum Geologists, Tulsa,
vol. 18, no. 2, 1934, pp. 161-190

A detailed technique is described for the measurement of the permeability of porous media by the use of liquids or gases. Derivations are given of the formulas by which the permeability may be computed from the laboratory measurements. In addition to defining a convenient permeability unit, it is proposed to call it the "darcy". Field measurements on the effective permeability of underground sands are discussed, and the appropriate formulas are derived. These include expressions for liquid flow, gas flow, gravity flow, and composite artesian and gravity flow in steady state. Correction curves are given for application where the wells do not completely penetrate the producing sands.--Author's abstract. (See also Geophys. Abs. 59.)

## (1876) GEOPHYSICS - ITS PROGRESS EXPLAINED IN SIMPLE TERMS

By Sherwin F. Kelly

Mining and Metallurgy, New York, vol. 15, 1934, preprint.

The author outlines very briefly the possibilities for the useful application of geophysics to geological investigations of all kinds (magnetic, gravitational, seismic and electrical methods).

Kelly emphasizes that in addition to the present application of the geophysical methods of prospecting for ore in the detail work and at shallow depths, there still remains the possibility of studying the structure and tectonics of the ground at great depths and over large areas. This possibility should be utilized by State and Federal geological surveys as a routine procedure in the study of major subsurface structures and formation, as such work can often point the way to hunt for economic mineral deposits.

As an illustration of such work Kelly mentions the exploration undertaken by the Spanish Government of part of the Andalusian coal basin in the Province of Sevilla, which resulted in the discovery of a zone containing coal beds at an exploitable depth.--W. Ayvazoglou.

## (1877) GEOPHYSICAL WORK ALONG GULF COAST ON INCREASE

(Editorial Note)

The Oil Weekly, Houston, vol. 72, no. 11, 1934, p. 65

Geophysical exploration, which has been increasing during the past year or two is now in full swing in several areas. The number of the crews is, according to this note, as follows: (1) In the Louisiana Gulf coast: Torsion balance - 37; seismic reflection methods - 8; pendulum method - 2; and magnetic method - 3. (2) In the Texas Gulf coast: Seismic methods - 18; torsion balance - 38; and magnetic method - 1.--W. Ayvazoglou.

## (1878) ÉTUDE DES EAUX PÉTROLIFÈRES

(STUDY OF PETROLIFEROUS WATERS)

By D. Chahnazaroff

Les Matières grasses, Paris, no. 309, Jan. 15, 1934, pp. 10052-10055

This is the continuation of the article published in previous numbers of the same magazine. (See Geophys. Abs. 57.)

The author gives the graphs for finding the specific gravity of mineralized water in oil-bearing deposits at any temperature, provided that the specific gravity of the same water at another temperature is known. By using hese graphs the specific gravity of the water in situ can be found, provided that the temperature of the water horizon under the ground and the pecific gravity of the water of that horizon at the surface are known.

If the specific gravity of the water in the oil-bearing deposit raised the surface is known the graphs can be used for finding: (a) The specific ravity of the same water in situ, and (b) the specific gravity of the same ater at the normal temperature taken as a basis for comparing the dynamic roperties of the waters.

The author explains further the construction of diagrams by which the nterpretation of the results obtained is made easier.--Author's abstract, ranslated by W. Ayvazoglou.

## 8. GEOLOGY

### (1879) CONTRIBUCION AL ESTUDIO DE LAS FENOMENOS QUE ACOMPANAN A LAS ACUMULATIONEC DE GAS EN UN YACIMIENTO PETROLIFERO

(CONTRIBUTION TO THE STUDY OF THE PHENOMENA ACCOMPANYING THE ACCUMULATION OF GAS IN OIL-BEARING DEPOSITS)

By D. Chahnazaroff

Petroleos y Minas, Buenos Aires, vol. 14, no. 153, 1934, pp. 6 - 9

The author establishes the general conditions of the subsoil under hich gas may accumulate in the oil fields and gives the results of his tudies on the existence of gas in the petroliferous deposits in the Comodoro ivadiva district in the south of the Argentine Republic.

The geology of this district is mentioned briefly, and the horizons arrying oil are studied.

The effects of the increase of temperature with depth, of the vicinity f magmatic masses, and of the presence of faults are discussed.

The importance of studying the dislocations of the overburden is demonstrated.--W. Ayvazoglou.

### (1880) TEXAS AND LOUISIANA SALT-DOME CAP-ROCK MINERALS

By Marcus A. Hanna and Albert G. Wolf

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 18, no. 2, 1934, pp. 212-225

This paper catalogues the minerals known to have been found associated with the salt domes of Texas and Louisiana. Twenty-eight minerals and varieties are listed. The paper is illustrated with 10 plates of photographs. The genesis of the minerals is not discussed. A bibliography of 15 papers pertaining to salt-dome minerals is given.--Author's abstract.

## (1881) IS IT POSSIBLE TO INCREASE GERMAN OIL PRODUCTION?

By A. Bentz

Oil Weekly, Houston, vol. 72, no. 8, 1934, pp. 22-24

A classification of German oil possibilities is given in the accompanying map. The following four different geological provinces known in Germany, which are interesting for oil are briefly described.

1. Upper Bavarian high plain. Oil deposits present in Tertiary beds; geophysical investigation shows the presence of favorable structures is probable.

2. Upper Rhine Valley graben. Oil deposits are probable in monoclines sloping from the border of the Rhine graben. Near Bruchsal a small field has been proven. Systematic drilling operations and detailed geophysical surveys are lacking.

3. Thuringian Basin. In the area between the Harz and Thuringian Mountains, oil has been found in the dolomite of the middle Zechstein (upper Permian).

4. North German plain. Probably 100 salt domes are present. Oil has been found in beds from the upper Triassic to the Tertiary on the edges of four salt domes. Tectonic conditions of the German salt domes are more complicated than those of the Gulf coast.--W. Ayvazoglou.

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## (1882) DIE ERDÖLVORKOMMEN IN MITTELASIEN

## (OIL DEPOSITS IN CENTRAL ASIA)

By S. Nassyrbajew

Petroleum, Berlin, vol. 30, no. 4, 1934 (Erdöl-Chronik und Statistik IV)

Although the presence of oil in many parts of the central Asia (Turkestan-Caspian-Sea plain; region between Thermes and the mouth of the Amu-Darja; region of Ferghana, and others) was established the prospecting work was so far insufficient and unsuitable.

Based on geophysical prospecting during the last years in these regions structural conditions were determined, especially in the district of Ferghana--of course only at shallow depths. The author emphasized the necessity of a careful investigation by using geophysical methods down to a depth of 2,000 meters.--W. Ayvazoglou.

## 9. NEW BOOK

883) Evershed and Vignoles, Ltd. Earth-resistance measurement, London, Evershed and Vignoles, Ltd., 1933, 52 pp. The object of this booklet is to bring within a small compass information on earth resistance measurement for the guidance of those concerned with such problems.

## 10. PATENTS

### (1884) PROCÉDÉ ÉLECTRIQUE ET APPAREIL POUR LA DÉTERMINATION DES TERRAINS TRAVERSÉS DANS LES SONDAGES

### (ELECTRICAL METHOD AND APPARATUS FOR DETERMINING THE STRUCTURE OF THE GROUND PENETRATED BY DRILLING)

Société de prospection electrique (Procédés Schlumberger of France (Seine)

rench patent 678,113 Issued March 19, 1930

This invention relates to a method by which the mechanical coring is eplaced by the electrical coring. Practical execution of this method conists of lowering into the nontubed part of the borehole an electrode conected by an insulated wire with the source of an electric current. The ifference of the potential between two points inside of the borehole at ifferent heights is measured by means of two other electrodes provided ith insulated wires and connected with measuring instruments placed on the urface of the ground.

Claims allowed - 1.

### (1885) APPARAT ZUM MESSEN DER SCHWERKRAFT

### (APPARATUS FOR MEASURING GRAVITY)

Firma Carl Zeiss of Jena

erman patent 584,256 Issued Sept. 16, 1933

This invention relates to an apparatus for measuring the gravity by determining the period of oscillation of several pendulums arranged in a ommon case provided also with means for lifting and locking the pendulums nside the case.

Claims allowed - 4.

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A. No. 61 UNITED STATES BUREAU OF MINES May, 1934.
Scott Turner, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

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Compiled by Frederick W. Lee

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# 1. GRAVITATIONAL METHODS

## (1886) GEOPHYSIKALISCHE METHODE ZUR ÜBERWACHUNG DER VULKANISCHEN TÄTIGKEIT

(Geophysical Method for Controlling the Activity of Volcanoes)

By W. C. Salm

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 1, 1933, p. 18

Salm briefly reviews I. A. A. Mekel's method (published in the Hollandische Wochenschrift "De Ingenieur", vol. 41, no. 45, 1926) concerning controlling the activity of volcanoes. The method is based on the supposition that the magma in the core of a volcano rises to a certain degree before the eruption. Mekel's mathematical calculations on the movements of the magma body in the volcanoes in Netherland India show that the values of the gravimetrical gradients change during the rising of the magma to about 14 units, therefore the phenomenon can be observed by the torsion balance.

Practical and scientific advantages of such observations are noted. According to Salm, demonstration of Mekel's method has not been tried.--W. Ayvazoglou.

## (1887) CONCLUSIONS DRAWN FROM THE GRAVITATIONAL ISOGAMS IN THE REGION OF EMBA. (In Russian)

By V. P. Skvortzov

Neftianoe Khoziaistvo, Moscow, vol. 25, no. 10, 1933, pp. 14-18.

Based on a few examples discussed in this article the author makes an attempt to use the isogams to solve various questions arising in the search for oil near Emba.

To solve question as to the structure of the lateral parts of salt domes and the structure between the domes, as well as series of others connected with the problem of prospecting for oil, the author proposes to make a selection and classification of known domes before the deep drilling is begun.

By comparing the data obtained from previous drillings with the gravimetrical map of the region the connection between the change of the thickness of the Permo-Triassic deposits and the change of gravity can be determined.

From conclusions drawn in this comparison the locations for starting the deep drilling can be selected.--W. Ayvazoglou.

## (1888) NOTE ON THE BEHAVIOR OF THE EÖTVÖS GRAVITY BALANCE IN FLUCTUATING GRAVITATIONAL FIELDS

By A. O. Rankine

Physical Society, London, Dec. 15, 1933

Attention is directed to the semidiurnal variation of gravity at a point on the earth's surface due to lunar attraction, recently measured by Loomis. This temporal variation of gravity is much larger than the spatial differences measured by the Eötvös gravity balance but produces no effect on the balance, constituting experimental proof of the power of the Eötvös instrument to discriminate between space and time changes of terrestrial gravitation.--Collated from abstract in Nature, vol. 133, no. 3350, 1934, p. 74.

## (1889) ON GRAVIMETRIC OBSERVATIONS IN THE FAR EASTERN DISTRICT (In Russian)

By A. S. Ulanoff

Records of the Far East Geophysical Institute, Vladivostok, no 2, 1932, pp. 111-116

The author gives a list of gravimetric stations in the far eastern region of the U. S. S. R. with the data of values of the acceleration of gravity. He concludes that from the point of view of the present demands for accuracy in the determination of gravity the data are not accurate enough and must be revised.--W. Ayvazoglou.

## (1890) LES EXPRESSIONS FINIES DE LA PESANTEUR NORMALE

(FINITE EXPRESSIONS FOR NORMAL GRAVITY)

By C. Somigliana

Bulletin géodésique, Paris, no. 38, April-May-June 1933, pp. 178-187

A mathematical discussion of equations derived by various authors for evaluating gravity is given.--W. Ayvazoglou.

## (1891) LA RÉDUCTION ISOSTATIQUE SELON L'HYPOTHÈSE DE AIRY

(ISOSTATIC REDUCTION ACCORDING TO THE AIRY HYPOTHESIS)

By F. A. Vening Meinesz

Bulletin géodésique, Paris, no. 38, April-May-June 1933, pp. 188-197

In this article the author suggests a method of isostatic computation. An example of the application of this method for a station in Netherland India where deviations in elevation are exceptionally great is given.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (1892) ÜBER EINE MAGNETISCHE ANOMALIE IN DER PRIGNITZ UND IHRE BEDEUTUNG FÜR DIE GEOLOGIE DES NORDDEUTSCHEN FLACHLANDES

### (ON A MAGNETIC ANOMALY IN PRIGNITZ AND ITS SIGNIFICANCE IN CONNECTION WITH THE GEOLOGY OF THE NORTH GERMAN PLAIN)

By H. Reich

Fortschritte der Geologie und Paläontologie, Berlin, vol. 11, 1932,
Deecke-Festschrift, pp. 99-119

Magnetic measurements of vertical variations by which a magnetic disturbing body was discovered north of the turn of the Elbe near Havelberg are communicated. The disturbed region expands north-south and is 25 km wide and 35 km long. The disturbance amplitude is about $200\gamma$. Relationship between the Tertiary tectonics and the magnetic disturbing body (massif) was established. The Miocene deposits were found to be especially connected with the borders of the massif. Distribution of the terminal moraines seems to be influenced by the underground massif. The orogenetic movements probably took place near the masiff-rands at the time before the last glaciation.

The course of the present rivers (the Dosse and the Stepnitz encircle the massif, and the Elbe and the Havel turn aside in front of it) prove that the rising process in the area of disturbance is lasting up to recent times.-- Author's abstract, translated by W. Ayvazoglou.

### (1893) DO MAGNETOMETER SURVEYS FAIL TO REVEAL COMMERCIAL STRUCTURES?

By W. P. Jenny

Oil Weekly, Houston, vol. 72, no. 13, 1934, pp. 16-18.

According to the author, failure of the magnetic method to reveal commercial oil structures must be attributed in the first place to poor accuracy of the field surveys. Two magnetometer maps of the Oklahoma City field area are compared in a figure. These two maps show discrepancies of over ± 75 gammas within a few miles distance. The accuracy of magnetometer surveys should approach - 5 gammas rather than - 50 to 100 and more gammas. In addition, the magnetic anomalies are much more difficult to interpret than gravitational anomalies, owing to variations between the direction of the inducing magnetic field of the earth and the strike of the magnetically active structure. Another difficulty in interpreting magnetic anomalies consists in the distinction between structural anomalies and petrographic or stratigraphic anomalies.

Concerning the future of the magnetic method, the author says that application of three-dimensional magnetic prospecting unquestionably will improve a great deal the chance of locating commercial structures magnetically;

magnetic investigations should besides be encouraged, as they may be of a great help for interpretation of results gained by the gravimetric and seismic methods. The advantages that may be derived by a combination of reflection with magnetic investigations are demonstrated in a figure. A magnetic survey also is justified economically in almost any prospect, owing to its cheapness compared with other geophysical surveys.--W. Ayvazoglou.

## (1894) MIDDLE WITWATERSAND (WESTERN AREAS) LIMITED

By G. J. V. Clarence

Mining and Industrial Magazine of Southern Africa, Johannesburg,
vol. 17, no. 11, 1934, p. 488

This is a report of the author, the technical consultant to the Anglo-Transvaal Consolidated Investment Co., on operations carried out on the properties from April to December 31, 1933.

According to this report, a magnetometric survey was begun by Doctor Heimburg in August with one magnetometer, yet up to December 31, 190 miles of section lines were completed and 3,000 stations surveyed. The results so far obtained show that the line of the Government reef shale (the last shale traceable by magnetic methods) runs southwest - northeast through the farms Welgegund, Welgevonden, and Wildebeestlaagte. The suboutcrops of the main reef should be expected in the southern portion of these farms, as well as on Oudedorp and Witkopjes, at a depth of about 3,500 feet, dipping southeast at about 20-25°.--W. Ayvazoglou.

## (1895) A SIMPLE METHOD OF DEMONSTRATING THE PARAMAGNETISM AND DIAMAGNETISM OF SUBSTANCES IN MAGNETIC FIELDS OF LOW INTENSITY

By A. O. Rankine

Proceedings of the Physical Society, London, vol. 46, pt. 3,
no. 254, 1934, 13 pp.

The instrument described is the result of an attempt to construct a magnetic gradiometer capable of measuring small distortions of the earth's magnetic field in the same way as the Eötvös torsion balance measures nonuniformities of gravity. Although this purpose has not yet been achieved, the first model of the instrument has revealed itself as a means of demonstrating convincingly the paramagnetism or diamagnetism of substances of small susceptibility, for example, the diamagnetism of a few cubic centimeters of water. Moreover, the magnetizing fields employed are much smaller than has hitherto been customary, being of the order of 50 gauss or less. This first model of the instrument is imperfect in certain respects, mainly on account of the use of some brass in the construction. The objections to this material on account of its ferromagnetic content were not realized at first, and it will be necessary to construct a new apparatus, employing carefully chosen materials, before full advantage can be taken of the sensitivity available, and demonstration refined to precise measurement.

It seems certain that gases also may be brought within the scope of accurate determination, particularly if access can be had to a suitable laboratory. The present apparatus, however, behaves well enough to warrant description, which is made pending the projected modifications.

The system used also provides a basis for the construction of a new form of very sensitive galvanometer, and this matter is discussed briefly.--Author's abstract.

## (1896) REPORT ON THE MAGNETIC INVESTIGATIONS OF THE GEOPHYSICAL INSTITUTE OF LWOW UNIVERSITY DURING THE YEARS 1928-29

By Edward Stenz and Henryk Orkisz

Institut de Géophysique et de Météorologie de l'Université de Lwow.
Communications, vol. 5, no. 60, 1930, pp. 429-443

The magnetic survey was begun with investigations near Lwow during the year 1928. The area surveyed was 2,250 km$^2$, the average distance of the stations was 3 km, and the number of stations 242, at which 250 measurements of inclination were made with a Chasselon's inclinometer.

The area of the magnetic survey made during 1929 covered 4,050 km$^2$ where 251 observations of inclination on a distance of 4 km were made; besides, on an area of 2,025 km$^2$, in 65 stations the horizontal intensity was measured and in 35 the declination, on an average distance of 6 km.

In the polygon Stryj-Stebnik-Synowodzko-Bolechow-Zurawno-Zydaczow-Stryj, a survey was made in 1929 with a Schmidt balance; 990 points of observation were 1 km distant from each other.

The results are shown in 1 table and 8 figures. The magnetic work during 1930 began June 1 with continuation of the absolute measurements in the Carpathians and the lowland in front of them (topographic sections: Dolina, Kalusz, Stanislawow).--W. Ayvazoglou.

## (1897) GRAPHICAL AIDS IN THE REDUCTION OF MAGNETIC OBSERVATIONS

By C. C. Ennis

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 38, no. 4, 1933, pp. 331-333

Ennis developed graphs for simplifying and expediting the computational work involved in the ordinary reductions of magnetic observations resulting from the photographic registrations at observatories. Using as an example the magnetic elements at Watheroo magnetic observatory the author shows in two figures the graphs for determining $\Delta X$, $\Delta y$, $\Delta I$, and $\Delta F$.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1898) MATÉRIAUX SÉISMO-TECTONIQUES (IN RUSSIAN)

### SEISMO-TECTONIC MATERIALS

By D. Mushketov

Académie des Sciences de l'U.R.S.S., Leningrad, Publications de l'Institut Séismologique, no. 33, 1933, pp. 1-17

In the first part of the article Mushketov discusses the principles and the materials involved for dividing the country into regions affected by earthquakes.

The second part deals with the scheme of this distribution in general.--W. Ayvazoglou.

### (1899) SEISMICAL REGIONS OF CENTRAL ASIA (IN RUSSIAN)

By D. Mushketov

Académie des Sciences de l'U.R.S.S., Leningrad, Publications de l'Institut Séismologique, no. 34, 1933, pp. 1-26

The author makes an attempt to divide the part of the Central Asia affec by earthquakes into a series of seismic regions, combining these regions into several groups. The main characteristics of these groups are discussed briefly.--W. Ayvazoglou.

### (1900) SEISMIC REGIONS OF CENTRAL ASIA FROM THE VIEWPOINT OF QUAKEPROOF STRUCTURES (IN RUSSIAN)

By V. Zschochr

Académie des Sciences de l'U.R.S.S., Leningrad, Publications de l'Institut Séismologique, no. 34, 1933, pp. 27-31

The influence of earthquakes upon structures and the necessity of determining the fundamental principles for erecting quakeproof structures in various regions of the U. S. S. R. are discussed.--W. Ayvazoglou.

### (1901) HISTORICAL AND STATISTICAL MATERIALS CONCERNING SEISMIC ACTIVITY IN CENTRAL ASIA (IN RUSSIAN)

By V. P. Spesivceva

Académie des Sciences de l'U.R.S.S., Leningrad, Publications de l'Institut Séismologique, no. 34, 1933, pp. 33-59

Based on the materials collected a seismotectonic map of Central Asia is drawn. The map is added to the article.--W. Ayvazoglou.

## (1902) SURFACE-REFLECTED WAVES OF SHALLOW-FOCUS EARTHQUAKES

By Ernest A. Hodgson

Bulletin of the Seismological Society of America, Stanford, Calif.,
vol. 24, no. 1, 1934, pp. 33-47

In the case of the seismological tables developed by seismologists during the first decade of the present century it was always assumed that the focus lay in the surface. Under such circumstances, the so-called $PR_1$-wave, the wave once reflected at the surface at a point midway between the focus and the point of observation, would be expected to have a travel-time double that for the compressional or P-wave to the midpoint. Observation failed to support the earlier $PR_1$-tables, which were constructed from P-tables on this assumption. It was found later that earthquake foci do not always, nor even generally, lie in the surface. Furthermore, the P-curves for earthquakes known to have shallow foci are now found to differ considerably from the earlier curves based on group data. It became desirable to study the travel-lines for the reflected waves from the data of a single well-defined earthquake. The seismometric study of the Tango earthquake, Japan, March 7, 1927 recently completed by the writer, furnished the opportunity for such a study, the results of which are presented in this paper.--Author's abstract.

## (1903) MATERIALS ON SEISMOLOGY OF THE FAR EAST (IN RUSSIAN)

By A. S. Ulanoff

Records of the Far East Geophysical Institute, Vladivostok,
no. 2, 1932, pp. 147-164

A list of earthquakes occurring up to 1930 is quoted. The hypocenters of earthquake are drawn in the accompanying map in accordance with the instrumental data. Special earthquake investigations were made only in two cases in Transbaikalia.--W. Ayvazoglou.

## (1904) A NOTE ON THE ANOMALY OF THE VELOCITY OF THE SEISMIC WAVES

By H. Honda

Geophysical Magazine, Tokyo, vol. 6, 1932, pp. 189-192

It is well-known that the velocity of the longitudinal waves which propagate through the continent is smaller than that of the waves which propagate through the ocean bed, and it is proved that similar relations exist also in the surface waves. Seismologists in Japan made many efforts to find the anomalies of the velocity of the seismic waves which appear in propagation through a small area. This problem is attacked by the author, and he believes the results of his investigations point to the fact that in the upper layer of the earth's crust the longitudinal waves propagate with greater velocity along the Pacific coast than along the Japan sea coast. The full account of the phenomena will be given as soon as more data are available.--W. Ayvazoglou.

## (1905) PROPAGATION OF SEISMIC WAVE IN JAPAN

By S. I. Kunitomi

Geophysical Magazine, Tokyo, vol. 6, 1932, pp. 207-213

In a paper published in 1924 by the Meteorological Society of Japan the author noticed that the apparent velocity of the seismic waves differed in the different direction of propagation. Kunitomi mentions that decided progress in seismic observations was made in Japan since that time, and extended study of the abnormal propagation of seismic waves was made all over the country. In this note the author summarizes the results of the researches.--W. Ayvazoglou.

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## (1906) ON THE TRAVEL TIME OF EARTHQUAKE WAVES (PARTS III AND IV)

By K. Wadati and S. Oki

Geophysical Magazine, Tokyo, vol. 7, 1933, pp. 113-153
(for parts I and II, see Geophys. Abs. 59)

The main results obtained are summarized by the authors as follows:

1. The time-distance curves, or, strictly speaking, the travel-time curves of P- and S-waves were found within the range of the epicentral distance of about 100°.

2. All the large earthquakes used for this investigation are those which occurred recently near the Japanese Islands, and special attention was paid to obtaining the position of epicenter, focal depth, and time of occurrence at the focus.

3. From three large earthquakes of shallow focus the "Japanese mean time-curve of P" was obtained.

4. This curve is considered to be the most accurate time-distance curve for earthquakes having shallow origin near the Japanese Islands; it is nearly the same as that obtained by Jeffreys but differs somewhat from those of other authors.

5. The time-distance curve of P-wave was obtained by the deep-focus earthquake whose focal depth was about 400 km.

6. It was difficult to get an accurate time-distance curve of the S-wave from earthquakes of shallow focus, even from those having a depth of 80 km, because the incidence of S-phase was not so distinct, especially at the small epicentral distance.

7. Therefore the time-distance curve of the S-wave was obtained from the deep-focus earthquake, and then the reduced curve was drawn.

8. Also in the case of S-wave the time-distance curve obtained by us was nearly coincident with that of Jeffrey's.

9. Almost all extraordinarily large earthquakes are apt to occur at the part of the crust whose depth can be assumed as 0 km, so far as the investigation of seismic wave propagation is concerned. Extraordinarily large earthquakes seem to occur near the earth's surface, or at very deep place of several hundred kilometers.

10. The reason why the time-distance curves obtained by many authors are different is mainly due to the feebleness of the incidence of seismic waves, inaccurate determination of the epicenter, focal depth, and the time of occurrence. And the effect of observational errors is considered to be small if compared with those mentioned above.

11. The influence upon the time-distance curve due to a special construction of the upper crust near the seismic origin or the observing place is too small to be found in the present investigation.

12. The propagating velocity of P-and S-waves in the earth's crust was calculated from the time-distance curves obtained by us by the method of Herglotz-Wiechert.

13. These velocities obtained by the present investigation were approximately similar to those already obtained by some authors, and particularly coincident with that obtained by H. Witte.

14. Remarkable discontinuities in the earth's crust were not observed from our investigations of the seismic wave velocities. But there were some depths at which they showed a comparatively rapid change. These depths were 800 and 1,400 km for the P-wave and 900 and 2,200 km for the S-wave, respectively, except the part near the surface.

15. The propagating paths of P-and S-waves from focus to station were somewhat different from each other. The former wave passed generally through a deeper place than the latter.

16. The Poisson's ratio obtained was approximately constant everywhere in the crust. Strictly speaking, however, it becomes slowly larger with the depth.—Author's abstract.

## (1907) ON THE TRAVEL TIME OF EARTHQUAKE WAVES (PART V)

By K. Wadati and K. Masuda

Geophysical Magazine, Tokyo, vol. 7, 1933, pp. 269-291

In this paper the authors give complete tables of travel times of various earthquake waves obtained from the results of the investigations made in previous papers (see Geophys. Abs. 59 and the article above).--W. Ayvazoglou.

### (1908) PRELIMINARY REPORT ON THE IRREGULAR PROPAGATION OF SEISMIC WAVES IN THE KWANTŌ DISTRICT

By K. Wadati

Geophysical Magazine, Tokyo, vol. 6, 1932, pp. 239-250

In one of his previous papers (Shallow and Deep Earthquakes, see Geophys. bs. 47, p. 764) the author affirmed that the irregular propagation of seismic aves in Japan was due mainly to a special structure of the upper earth's rust.

In the present investigation Wadati treats the irregular propagation of eismic waves in a limited region to study the local structure of the upper rust. For this purpose, the Kwanto district is considered by him to be the ost preferable because seismic waves are usually observed to propagate very irregularly in this district; besides there is a fine network of seismological tations.

(1) Observational materials; (2) isochronal lines of P and (P-S); (3) irregular ropagation of seismic waves; (4) relation between the irregular propagation nd the depth of earthquake focus; (5) the structure of the upper earth's crust in the Kwanto district; and (6) the anomalies of gravity in the Kwanto district are headings under which the question is discussed.--W. Ayvazoglou.

### (1909) THE PROPAGATION OF ELASTIC WAVES IN A HETEROGENEOUS MEDIUM AND THE CONDITION FOR THE VALIDITY OF THE RAY THEORY

By H. Arakawa

The Geophysical Magazine, Tokyo, vol. 7, 1933, pp. 155-161

In the study of the transmission of elastic waves in the earth crust the ray theory deduced directly from Fermat's principle of the least time has been used, according to the author, especially among Japanese seismologists. From the investigations discussed in this paper the author draws the conclusion that:

> The ray method is valid for the propagation of waves in the deep interior of the earth, but it fails for the propagation of waves in the upper part of the earth crust especially for the surface layer down to 20 kilometers.--W. Ayvazoglou.

### (1910) LONG-PERIOD HORIZONTAL SEISMOGRAPH

By H. Honda, K. Sagisaka and M. Tamura

Geophysical Magazine, Tokyo, vol. 7, 1933, pp. 245-247

A brief description of the long-period seismograph designed by the authors is given. A specimen of a seismogram of an earthquake recorded by it is added.--W. Ayvazoglou.

## (1911) THE FUNDAMENTAL THEORY AND PRACTICAL APPLICATION OF SEISMIC PROSPECTING METHOD (IN JAPANESE)

By H. Aoyama, S. Haeno, M. Ishizaki and I. Mikawa

Journal of the Mining Institute of Japan, Tokyo, vol. 49, no. 575, 1933, pp. 131-147.

The English abstract of the paper reads as follows:

First, we explained the fundamental theory of seismic prospecting from the standpoint of the actual utilization such as the properties of the earth elastic waves and the propagation paths of them in the subsurface of the earth; then the methods of detecting these short periodic elastic waves caused by the artificial earthquakes were discussed. Next, the recent results of the seismic prospecting carried out by the authors near Akabane, Tokyo, are described.--Author's abstract.

## 4. ELECTRICAL METHODS

## (1912) THEORETISCHE GRUNDLAGEN DER RINGSENDMETHODE

## (THEORETICAL PRINCIPLES OF THE LOOP CIRCUIT METHOD)

By Anton Graf

Beiträge zur angewandten Geophysik, Leipsig, vol. 4, no. 1, 1933, pp. 1-75

The author determined the primary and the secondary fields due to an alternative current in a loop circuit by calculation; the secondary field being induced by eddy currents due to the induction in any thin sheet with unlimited extension in all directions and at any dip and depth. The secondary field has been determined also by applying a graphic method, the latter being due only for the case of small and large values of the number obtained by multiplication of the conductivity and the frequency. For the interjacent values the direction and the magnitude of the secondary field may be approximated only, as difficulties arise by the calculation of these values as the result of the divergence of the series of $\sqrt{\sigma}$ and $\frac{1}{\sqrt{\sigma}}$, the reduction to known integrals being excluded also. Though it is possible to catch sight of the distribution of the field in this interjacent range (thus for the average values of both; $\sqrt{\sigma}$ and the depth) due to the fact that the limits ( $H$ for small or large $\sqrt{\sigma}$ and any depth and $H$ for small or large depth and any $\sqrt{\sigma}$ ) can be determined very accurately.

The author continues his article by giving the method for the determination of the depth and of the dip together with some examples. This is followed by a discussion of the analogy of the loop-transmission method and the resistivity, respectively the ratio method for the determination of the depth and the dip.--Author's abstract.

## (1913) GROUND-WATER INVESTIGATIONS BY GEOPHYSICAL METHODS

By J. McGarva Bruckshaw and F. Dixey

The Mining Magazine, London, vol. 50, no. 2, pp. 73-84, and no. 3,
pp. 147-154, 1934

The authors briefly outline the assistance applied geophysics can give the search for ground water and the results achieved to date in various rts of the world.

The gravimetric, magnetic, and seismic methods may be applied to the inirect location of ground waters as they are able to detect and define with ome accuracy the various structures likely to be associated with its accumuation; but the objection of cost may eliminate the gravimetric and seismic ethods, and the magnetic method would have little application in the search or water.

The application of the electrical methods, particularly the resistivity ethod, is considered by the authors of the greatest interest in this problem; hus this method forms the main subject of the paper.

After a brief theoretical discussion the authors examine the application f electrical methods to ground-water problems under two heads: First, direct ocation of the water itself; and, second, determination of structures favorble for the accumulation of water.

The following simple cases which may serve as a guide in the elucidation f the more difficult problems are considered:

1. Alluvium and superficial deposits: (a) Uniform depth to water table; (b) perched water bodies; (c) alluvium-filled valleys in older rocks; and (d) subsurface flows beneath dry river courses.

2. Crystalline rocks: (a) Weathered rocks; uniform depth to water-table; (b) isolated pockets of water-bearing weathered rocks; (c) well-jointed rocks; (d) faults and fracture-zones; (e) belts of schist and gneiss; (f) dikes; and (g) underground channels.

3. Older sedimentary rocks: According to the authors, the occurrence of water in the older sedimentary formations, as opposed to the younger sediments dealt with under 1, will present electrical problems similar to those described in this article.

In the second part of the article the authors examine:

4. Relation of electrical indication to possible yield of water: With the methods available it is not possible to differentiate between a bed of clay with high absorption and low yield and a bed of sand with a much lower water content and a high yield.

5. Effect of clay beds at various depths: So long as the bed persists throughout the area examined a bed of clay will not introduce any serious complication.

6. A real survey: In examining the water supply condition of a plain area measuring ten or more miles across, the resistivity method could give great assistance.

7. Electrical coring of boreholes: Can be applied to determine the difference between a non-porous bed of clay and a porous water-bearing sand belt.

The following sections are also included:

8. Resistivity field equipment: Various apparatus are discussed.

9. Personnel: The personnel required consists of 1 technical man and assistant and 2 or 3 laborers.

10. Number of stations per day: According to an approximate estimation of the authors 50 to 60 measurements per day can be made when the Megger earth tester is used and 40 to 50 stations with the potentiometer method or the Gish-Rooney method.

The interpretation of the resistivity curves and the applications of the ratiometer to water problems are discussed in two appendices respectively.--W. Ayvazoglou.

## (1914) A GEOPHYSICAL EXPLORATION IN CHILE

By N. Gella and H. Bertram Bateman

The Mining Magazine, London, vol. 50, no. 2, 1934, pp. 84-87

The geophysical exploration of ore zones concentrated in the neighborhood of two low hills known as Chuchunco and Escarpe, near the town of Talca in the Coastal Cordillera, Chile, is described.

Geology.--The deposits of porphyritic formation occur as nests or lenses of very irregular form and content.

Survey.--Investigation was carried out by electrical methods, first galvanic and subsequently by inductive methods. The results of the investigations may, according to the authors, be regarded as satisfactory.

The total time of the investigation was about 4 weeks, and three engineers were employed at a total cost of some £600.--W. Ayvazoglou.

## (1915) AN INSTRUMENT FOR ELECTRICAL PROSPECTING BY THE INDUCTIVE METHOD

By J. McGarva Bruckshaw

Proceeding of the Physical Society, London, vol. 46, pt. 3,
no. 254, 1934, 15 pp.

This paper deals with an examination of the condition in the Bieler-atson method of geophysical surveying and demonstrates that, in general, he horizontal field is not in quadrature with the vertical field. An nstrument has been designed which will allow the horizontal field to be ompared completely with the vertical field, the important feature of the nstrument being that the horizontal components in phase and in quadrature ith the vertical field are obtained directly from the instrument readings. he apparatus has been tested on elliptically polarized fields and has iven satisfactory results.--Author's abstract.

## (1916) EXPERIMENTS RELATING TO THE STUDY OF THE ELECTRICAL RESISTIVITY OF THE EARTH'S CRUST AT DEPTH

By L. B. Slichter

The Physical Review, Lancaster, vol. 45, no. 4, 1933, p. 286

This is an abstract of the paper presented by Slichter at the thirty-ifth annual meeting of the American Physical Society at Boston on December 8-30, 1933. The abstract read as follows:

> It is known that knowledge of the surface potentials induced in a horizontally uniform flat earth by a direct-current flow from a point electrode uniquely determines the unknown variation of the electrical resistivity with depth. The present experiments were undertaken to obtain experience in the technique of mapping electrical potentials on a large scale on the surface of the earth. An earth-current flow was established between a grounded electrode at Clinton, Mass., and a second electrode, about 50 km away, near Boston. A 6-kilowatt commutated d.c. source, and power-line facilities kindly provided by the New England Power Association and the Edison Electric Illuminating Co. of Boston were used. The ground potentials produced by this flow were systematically measured in an area about 80 km in diameter centering at Clinton, with the farthest point 140 km away, at Pittsfield, Mass. The New England Telephone & Telegraph Co. generously provided the circuit facilities for measuring these potentials. The resulting potential map is shown, and the experimental problem discussed.

## 5. RADIOACTIVE METHODS

### (1917) TECHNIQUE FOR THE DETERMINATION OF THE RADIOACTIVE CONTENT OF LIQUIDS

By Robley D. Evans

The Review of Scientific Instruments, Lancaster, vol. 4, no. 4,
1933, pp. 216-222

A simplified apparatus for the separation of RA from liquids is described; an apparatus for measuring small quantities of RA and Th, consisting of a cylindrical ionization chamber, humidity-proof isolation, and bifilar electrometer is described.--W. Ayvazoglou.

### (1918) THE EFFECT OF THE EARTH'S MAGNETIC FIELD ON THE PROPAGATION OF SHORT WIRELESS WAVES

By J. A. Ratcliffe and E. L. C. White

Philosophical Magazine, London, vol. 16, no. 103, 1933, pp. 125-144.

The paper describes the construction and use of a circularly polarized receiver which makes it possible to pick out the right and left circularly polarized components for a wave incident vertically.

The polarized receiver is used to test several deductions from the magneto-ionic theory, for a wave-length less than the critical magneto-ionic wave-length of 214 m. Magneto-ionic effects are found in both the upper (f) region and the lower (E) region, pointing to the fact that electrons are responsible for deviation of the waves in both regions. The occurrence of simultaneous reflexions from the E and the F regions is investigated, and the polarization of day time signals is discussed.--Authors' abstract.

### (1919) NATURE OF COSMIC RADIATION

W. Kolhörster

Physikalische Zeitschrift, Leipzig, vol. 34, Nov. 15, 1933, pp. 809-819

Review recent researches on cosmic rays, including consideration of the following: Methods of measurement, characteristics of the cosmic radiation, geographical distribution, latitude effect, geomagnetic distribution, azimuthal asymmetry, investigation of magnetic deflection, distribution of direction in the vertical, non-periodic variations, periodic variations, distribution as to height, secondary rays, transition effect, secondaries through several coincidences, cloud chamber photographs and the energy of the rays, cosmic rays as corpuscular radiation.--Reprinted from Science Abs., vol. 37, no. 433, 1934, p. 44, signed J. J. S.

## 6. GEOTHERMAL METHODS

### (1920) ÜBER DIE BESTIMMUNG DER TEMPERATUR IN DER UNMITTELBAREN NÄHE DER ERDOBERFLÄCHE IM HINBLICK AUF TEKTONISCHE UNTERSUCHUNGEN

(ON THE DETERMINATION OF THE TEMPERATURE AT THE IMMEDIATE PROXIMITY OF THE EARTH'S SURFACE IN CONSIDERATION OF TECTONIC INVESTIGATIONS)

By W. C. Salm

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 1, 1933, pp. 116-118

Salm reviews in this article the paper concerning the measurements of he horizontal temperature over the southern border of the Winterswijk horst n Holland, published by Dr. van den Bouwhuysen.

The nine chapters deal with: The measurements of the temperature near he surface; the description of the instrument; methods of measurement; the onditions of the area under investigation; the results of measurements; he correlation of the observations; considerations on the temperature of the round; the theory of the distribution of the temperature on both ends of the orst; the determination of the internal condrctivity of heat in various cks; and finally with the verification of the theoretical conclusions by bservations.

According to the author, the results obtained agree well with the gravietric gradients known for this region, as well as with the geological proiles determined by drilling.--W. Ayvazoglou.

### (1921) POST GLACIAL TIME CALCULATIONS FROM RECENT GEOTHERMAL MEASUREMENTS IN THE CALUMET COPPER MINES

By W. O. Hotchkiss and L. R. Ingersoll

Journal of Geology, Chicago, vol. 42, no. 2, 1934, pp. 113-122

The retreat of the glacial sheet a number of thousand years ago and the subsequent long-period surface temperature variations must almost certainly have left their impress on the geothermal curve. An attempt has been made to find such an effect and to interpret it in terms of past surface temperatures by subjecting to mathematical analysis a series of geothermal measurements recently made in the Calumet & Hecla conglomerate mine. The results indicate that the glacial epoch ended for this region 20,000-30,000 years ago, and that it was followed by a period with ground temperatures distinctly warmer than the present, succeeded in turn by one cooler, and lasting until comparatively recent times.--Authors' abstract.

## 7. UNCLASSIFIED METHODS

### (1922) GEOPHYSICAL INVESTIGATIONS IN SOUTHERN AFRICA

By R. Krahmann

Beiträge zur Angewandten Geophysik, Leipzig, vol. 4, no. 1, 1933,
pp. 88-116

The kinds of geophysical methods of prospecting used so far in Southern Africa, the nature of deposits and geological problems to which they were applied, and the results obtained are explained in this article with the aid of maps and eight tables in which 47 geophysical investigations in Southern Africa are summarized.--W. Ayvazoglou.

### (1923) ETUDE DES EAUX PÉTROLIFÈRES

### (STUDY OF PETROLIFEROUS WATERS)

By D. Chahnazaroff

Les Matières grasses, Paris, no. 310, Feb. 15, 1934,
pp. 10080-10085

This is the last article from a series published by the author, during almost 2 years, on the study of petroliferous waters (see Geophys. Abs. 60).

A graphic method for determining the direction of the flow of petroliferous waters, based on the measurements of the specific gravity and temperature of these waters, is given. In this work Chahnazaroff attempts to apply geophysical observations for the struggle against the inundation of oil-bearing fields.--W. Ayvazoglou.

### (1924) EXAMINING A PLACER BY GEOPHYSICAL METHODS

By J. J. Jakosky and C. H. Wilson

Engineering and Mining Journal, New York, vol. 135, no. 2, 1934,
pp. 71-74

This is an extract from Jakosky and Wilson's paper Geophysical Studies in Placer and Water-Supply Problems issued as Technical Publication 51[illegible], 1933, by the American Institute of Mining and Metallurgical Engineers (see Geophys. Abs. 58, p. 1072).

A specific case in Trinity County, Calif., is discussed. After careful reconnaissance of the whole property, between 500 and 600 acres were selected for detailed work. Magnetic measurement of the vertical intensity were made at 242 stations over the area, at intervals of 300 to 400 feet. Magnetic alues were plotted in the form of magnetic contours. Electrical measurements ere made at 37 stations distributed at regular intervals. All electrical urves showed the potential variation from the surface to a depth of 600 feet t suitable depth intervals. From these curves, the depth to bedrock at each tation was determined. Results of the complete electrical survey are expressed n cross-sections of the deposit along the lines of the survey.

The complete geological, topographic, magnetic, and electrical survey equired about 1 month and was made at a cost of approximately $3.30 per acre, xclusive of the living expenses of the crew.

The magnetic equipment used for this work was the conventional Schmidt-ype field balance. The electrical equipment is of two general types: (1) or measuring electromagnetic field strength; and (2) for measuring surface otentials.--W. Ayvazoglou.

## (1925) GEOPHYSICAL PROSPECTING IN JAPAN: THE PRESENT STATUS

By Yoshigo Fujita

The Mines Magazine, Denver, vol. 24, no. 3, 1934, pp. 22-27

In the introduction to this article Fujita says that, in general, ore-posit conditions, geology, and topography in Japan are not particularly uitable for exploration for minerals by geophysical prospecting methods. or example, if 2 or 3 weeks' field work is done with the gravity variometer, bout 1 year has to be spent in calculating the topographic corrections. hese conditions have hindered the development of geophysical methods of rospecting.

A historical outline on the development of the geophysical prospecting ork up to the present time by the (1) electrical methods (determination of esistivity of samples; self-potential method; current-supplied equipotential ethod; electro-magnetic method; resistivity method); (2) magnetic methods; (3) gravitational methods; and (4) seismic methods is given.--W. Ayvazoglou.

## (1926) GEOPHYSICAL PROSPECTING ACTIVITY IN ALL AREAS INDICATES NEED FOR ADDITIONAL OIL RESERVES

By L. G. E. Bignell

Oil and Gas Journal, Tulsa, vol. 32, no. 39, 1934, pp. 16 and 52.

According to estimations made by an executive of one of the major oil ompanies doing business in the Mid-Continent area, approximately $7,000,000 as spent during 1933 for geophysical field parties in Texas, Oklahoma, and ansas alone.

Intensive search for buried structures by geophysical methods continues; and, according to figures by Bignell, about 60 parties are now in the field in the following states only: Texas and Louisiana - 26; Oklahoma - 18, Kansas - 12; Colorado - 1; Nebraska - 1; and California - 2.

In the second part of the article the author gives a brief explanation of the seismic methods of prospecting.--W. Ayvazoglou.

### (1927) FIFTH GENERAL ASSEMBLY OF THE ASSOCIATION OF TERRESTRIAL MAGNETISM AND ELECTRICITY AT LISBON, PORTUGAL, SEPTEMBER 14 to 23, 1933

By J. A. Fleming and H. D. Harradon

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 38, no. 4, 1933, pp. 313-322

A large number of reports on current research and communications dealing with specific investigations in terrestrial magnetism and electricity were presented at the meetings. All these papers will be published in full or in abstract in the Transactions of the Lisbon Assembly, which it is expected will be issued in 1934.

Twenty three resolutions adopted by the Association are given.--W. Ayvazoglou.

## 8. GEOLOGY

### (1928) SALT DOMES

By R. V. Browne

Journal of the Institution of Petroleum Technologists, London,
vol. 20, no. 123, 1934, pp. 73-93

Browne discusses the question on the salt domes under the following headings: (1) Surface features; (2) the structure of the salt domes--(a) the source and age of the salt; (b) the form of the salt mass; (c) the cap rock; (3) the mechanics of salt dome formation; (4) The influence of salt domes on the generation and concentration of petroleum.

Author's conclusion: The early days of salt-dome study were notable for a flood of irrational theories, in which the facts were made entirely subordinate to those theories. This flood has now subsided, and more critical examination of the data provided has resulted in sweeping away all the speculative ideas in which so many people indulged.

The following points are now generally agreed to:

1. The salt of salt domes is derived from normal sedimentary saline deposits.

2. The flow of the salt is due to earth pressure, aided possibly by circulating waters, intercrystalline solution and redeposition.

3. Both tangential pressure and weight of overburden are responsible for salt-dome formation. The relative importance of these two factors varies in different localities. In general, however, it may be said that while tangential pressure may determine the orientation and initiation of the domes, the force which drove them upward is mainly due to the weight of overburden. In Rumania, the overburden appears to have played a subordinate part, the present position of the salt being due probable to pure thrusting.

4. The origin of the caprock is by no means clear. Further research is necessary before an agreed conclusion can be reached.

5. There is only a faint theoretical possibility of a relation between salt domes and petroleum formation. Their effect is that of providing a structure that would greatly accelerate lateral migration, direct such migration towards the crest of the dome, and favor a general concentration of the oil in flank of cap.--

## 9. NEW BOOKS

(1929) Fleming, John A. Annual report of the Director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington. Reprinted from year book no. 32, for the year 1932-33, issued December 15, 1933, pp. 213-264.

Contents: (1) General summary. (2) Investigational and experimental work: (a) terrestrial magnetism and electricity and cosmical relations; (b) magnetism and atomic physics (experimental, theoretical); (c) terrestrial electricity. (3) Field work and reductions: (a) Land magnetic survey; (b) observatory work; (c) oceanographic reductions. (4) Instrument shop. (5) Miscellaneous activities. (6) Abstracts of publications, lectures, and progress reports. (7) Personnel.

(1930) Fowle, Frederick E. Smithsonian Physical Tables, Smithsonian Miscellaneous Collection, vol. 88, 8th revised edition, Publication 3171, 1933, 682 pp. Published by the Smithsonian Institution, Washington.

The tables contain many geophysical data (tables 712 to 747, pp. 569-596) such as: Densities and pressures of earth's interior; velocities of earthquake waves; elastic constants of earth's interior; age of earth and its strata; magnetic and electric data for sun and earth; magnetic constants of the earth; charts of: world isogonic lines D; world isoclinic lines, I; world isodynamic lines, H; world isoporic lines D; world isoporic lines I; world isoporic lines H; annual changes in magnetic declination, horizontal intensity; world isoporic lines of the vertical and total intensity; mean annual values of magnetic elements at observatories, etc.

(1931) Kalinowski, St. Zdjecie Magnetyczne Polski (Magnetic Survey of Poland) Warzawa, Trav. Obs. Mag. de Swider, no. 5, 1933, 152 pp., 5 maps.

Contains historical and descriptive account of the magnetic survey of Poland and of the magnetic observatory at Swider. Values of the magnetic elements at 375 field stations are given.

## 10. PATENTS

### (1932) ELECTRICAL PROSPECTING

Theodor Zuschlag, New York, N. Y., assignor to Swedish American Prospecting Corporation, New York, N. Y., a corporation of New York.

U. S. Patent 1,951,386 Issued March 20, 1934

This invention relates to electrical prospecting and has for its object certain improvements in the method of electrical prospecting. The invention relates more particularly to an improved method that may be employed for determining and comparing electrical potentials or electromagnetic field strength such as are encountered when investigating artificial electric ground fields set up for the purpose of making geophysical explorations on the earth's surface.

Claims allowed - 16.

### (1933) ELECTRICAL PROSPECTING

Theodor Zuschlag, New York, N. Y., assignor to Swedish American Prospecting Corporation, New York, N. Y., a corporation of New York.

U. S. Patent 1,951,387. Issued March 20, 1934

This invention relates to improvements in the apparatus for electrical prospecting comprising a detached field excitation device for setting up an electric ground field, a compensating network associated but not connected with said excitation device and including two circuits in parallel each of which is provided with at least one variable resistance and two electrically identical resistances connected in series with said variable resistances.

Claims allowed - 24.

## (1934) APPARATUS FOR GEOPHYSICAL EXPLORATION

Russel H. Varian, Houston, Tex., assignor to Standard Oil Development Co.,
a corporation of Delaware

U. S. Patent 1,951,716 Issued March 20, 1934

This invention relates to an apparatus for measuring the magnetic field produced by a periodically reversed electric current passing through the earth, comprising a body responsive to magnetic influence and adapted to vibrate or oscillate at the frequency of the current, means for concentrating upon said body, a magnetic field produced by the current, and means for annulling any steady magnetic field that may be present.

Claims allowed - 4.

## (1935) METHOD OF CONDUCTING GEOLOGICAL SURVEY

Frederick W. Lee, Baltimore, Md.

U. S. Patent 1,951,760 Issued March 20, 1934

This invention relates to the method of determining the character of earth in various directions and at various depths or distances from a pair of current electrodes inserted into the earth which consists in comparing the resistivity of a portion of the earth located between a pair of spaced points with the resistivity of another portion of earth located between a second pair of spaced points, said pairs of points being respectively located at opposite sides of a straight line intersecting said pair of electrodes.

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G. A. No. 62 UNITED STATES BUREAU OF MINES June, 1934.
Scott Turner, Director

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# GEOPHYSICAL ABSTRACTS
## MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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## 1. GRAVITATIONAL METHODS

### (1936) ÜBER EINE MÖGLICHKEIT ZUR EMPFINDLICHKEITSSTEIGERUNG DER HEBELWAAGE UND IHRE ANWENDUNG ZUR MESSUNG DES VERTIKALEN GRADIENTEN DER SCHWERKRAFT

(ON THE POSSIBILITY OF INCREASING THE SENSITIVITY OF THE BEAM BALANCE AND ITS APPLICATION FOR MEASURING THE VERTICAL GRADIENT OF GRAVITY)

By S. Reisch

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 134-151

The author discusses the possibility of increasing the sensitivity of a beam balance 10,000 times by using a photoelectric reading device. In connection with this Reisch examines the necessary requirements of construction by which the highest possible accuracy in measuring the vertical gravity gradient may be obtained.--W. Ayvazoglou.

### (1937) OBSERVATIONS DE LA PESANTEUR DANS LE NORD-EST DE LA CHINE

(GRAVITY OBSERVATIONS IN THE NORTHEASTERN PART OF CHINA)

By P. Lejay and Lou Jou Yu

Comptes rendus de l'Académie des Sciences, Paris, vol. 198, no. 10, 1934, pp. 905-907

Brief note on the gravimetrical determinations carried out by the authors on a large scale in the northeastern part of China (Provinces of Hupeh and Shansi).

The mean distance between the stations was 100 kilometers; an area over 500,000 square kilometer was covered. The measurements were made with the Holweck-Lejay gravity meter no. 42.--W. Ayvazoglou.

# (1938) MÉTHODES DES CORRECTIONS TOPOGRAPHIQUES ET CARTOGRAPHIQUES UTILISÉES EN PROSPECTION GRAVIMÉTRIQUE

## (METHODS OF TOPOGRAPHIC AND CARTOGRAPHIC CORRECTION USED IN GRAVIMETRIC PROSPECTING)

By C. L. Alexanian

Annales de l' office national des combustibles liquides,
Paris, vol. 9, no. 1, 1934, pp. 117-142

Continuation of paper published by Alexanian in vol. 8, no. 4, 1933,
f the same magazine (see Geophys. Abs. 56, p. 982).

The following graphic methods are discussed in this issue:

1. Numerov's Method: B. Numerov. (1) Graphische Methode zur Berück-
ichtigung des topographischen Einflusses und des Einflusses der unterird-
schen Massen auf die gravimetrischen Beobachtungen, Zeitschrift für
eophysik, 1924-1925, no. 8, pp. 367-371, (2) Die topographische Reduktion
ei Drehwagenbeobachtungen, Zeitschrift für Geophysik, 1928, no. 3, pp.
17-134 (see Geophys. Abs. 5, p. 2).

Alexanian's remark: A quick estimation of corrections can be made by
umerov's method for masses situated at distances from 50 to 500 meters.
or distances less than 50 meters Numerov uses an analytical method, very
imilar to that developed by Schweydar.

2. Heiland's Graphic Method: C. A. Heiland. A new graphic method for
orsion balance topographic corrections and interpretations, Bulletin of the
merican Association of Petroleum Geologists, vol. 13, no. 1, 1929, pp.
7-74 (see Geophys. Abs. 5, p. 4).

In a remark concerning the application of Heiland's graphic method
lexanian says: "The method for outlining the diagrams is complicated and
ften imaginative; however, even in the opinion of the author himself, its
ractical application may be very suitable. For the estimation of the cor-
ections, transversal profiles around the station, the azimuths of which are
n an arithmetic progression, are drawn. The diagrams are placed over these
rofiles and according to them the excess or the deficiency of the action of
he mass can be determined (+ sign or - sign, according to the case). The
igns change according to the azimuth of the profile. The total action is
erived from the algebraic summation of the partial effects. During the
alculations the horizontal and the vertical scales must always be the same.
he author does not give any example of application."

3. Jung's Method: K. Jung. Diagramme zur Bestimmung der Terrainwirkung
ür Pendel und Drehwage und zur Bestimmung der Wirkung "zweidimensionaler"
lessanordnungen, Zeitschrift für Geophysik, vol. 3, no. 5, 1927, pp. 201-212.

The method of using these diagrams will be shown in practical application of them.

4. Haalck's Method: H. Haalck, Die gravimetrischen Verfahren der angewandten Geophysik, Berlin, Gebrüder Borntrager, 1929, pp. 107-132 (see Geophys. Abs. 10, p. 2).

Alexanian concludes the examination of Haalck's method by the remark that the method is good only for favorable terrain; he adds that, of course, this condition is required by all the methods of correction.

The article is to be continued.--W. Ayvazoglou.

## (1939) RELATIVE GRAVITY DETERMINATION BY MEANS OF SHORT WIRELESS WAVE COMMUNICATION

By Motoharu Kimura

Bulletin of the Earthquake Research Institute, Tokyo, vol. 12, no. 1, 1934, pp. 1-14

An extract of this publication appeared already in the Proceedings of the Imperial Academy, Tokyo, vol. 9, no. 8, 1933 (see Geophys. Abs. 58, p. 1061).

The question of relative gravity determination is discussed by the author in this complete paper under the following headings:

1. Principle of the present method of gravity determination.
2. Transmitting system.
3. Receiving system.
4. Measurements.
5. Accuracy of the measurements.
6. Results of the determination.
7. Appendix.

Fourteen figures are added.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (1940) UNTERSUCHUNGEN AUS DEM GEBIET DER ANGEWANDTEN GEOPHYSIK DES STAATLICHEN GEOPHYSIKALISCHEN INSTITUTS DES TSCHECHOSLOWAKISCHEN REPUBLIC IN PRAHA

### (RESEARCH WORK IN THE DOMAIN OF APPLIED GEOPHYSICS IN THE STATE GEOPHYSICAL INSTITUTE OF CZECHOSLOVAKIAN REPUBLIC IN PRAGUE)

By F. Cechura

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2,
1934, pp. 119-125.

The author publishes a few results of magnetic surveys carried out in Czechoslovakia by the State Geophysical Institute. The results are shown in figures: Figure 1 gives the anomalies determined by the Kohlrausch horizontal variometer; figure 2 shows a detailed survey of the basalt-mountain Rip in Bohemia, carried out by Schmidt's vertical variometer; figure 3 represents the map of the magnetic declination at the Rip-mountain; and figure 4 displays the contact boundary between the slate and the granite in the east part of Pribram.--W. Ayvazoglou.

### (1941) DETERMINACION DE LAS CONSTANTES MAGNETICAS DE LAS IMANES AUXILIARES USADOS EN LOS MAGNETOMETROS

### (DETERMINATION OF MAGNETIC CONSTANTS OF THE AUXILIARY MAGNETS USED IN MAGNETOMETERS)

By Alfredo Baños, Jr.

Secretaria de la Economia Nacional, Departamento de Petroleo,
Seccion de Geofisica, Mexico, D. F. Tech. Pub.
2, 1933, 33 pp.

Contents:

Introduction.

Fundamental principles.

Magnetic methods of geophysical prospecting.

Auxiliary magnets used in the various methods: (a) Thalen-Tiberg magnetometer; (b) Haalck's universal variometer; (c) magnetic balances (Askania, Töpfer, Oertling); (d) Koenigsberger's vertical variometer.

Teoloyucan magnetometric inductor: (a) Measurement of inclination; (b) measurement of declination; (c) measurement of the horizontal component.

Determination of constants of magnets.

Derivation of coefficients of distribution.

Calculation of magnetic moment.

Conclusions and bibliography.

The following conclusions are drawn by the author:

1. The importance of an exact determination of the constants of the auxiliary magnets used in various methods of geophysical prospecting is demonstrated.

2. The magnetometric inductor of the Teoloyucan Magnetic Observatory is briefly described with special attention to the details concerning the experimental determination of the magnetic moment and the auxiliary magnets.

3. Hartnell's formula for calculating the magnetic moment and the method allowing the use of the Teoloyucan magnetometric inductor in practice is given.

4. A mathematical analysis of the "induction factor" of one magnet with relation to the other in function of the "coefficients of the distribution" P and Q is made independently of Hartnell's method giving the solution in terms of spherical harmonics.

5. Numerical calculation of the magnetic moment of a magnet using the data obtained by the magnetometric inductor, showing the practical application of these formulas, is given in an example.--W. Ayvazoglou.

## (1942) MEASUREMENT OF MAGNETIC FIELD DISTORTION

By A. O. Rankine

Physical Society Proceedings, vol. 46, Jan. 1, 1934, pp. 1-15

Magnetometers of the portable, field type used in geophysical prospecting for measuring the local distortion of the earth's magnetic field due to magnetized buried masses depend for their sensitivity on the compensation of the regional field by means of torsion wires, currents, balance weights, and similar devices. In the analogous gravitational field the Eötvös torsion balance presents an arrangement which is in effect self-compensating and which is only sensitive to local spatial variations in the general field of gravity. In particular, such an arrangement is insensitive to those temporal variations of the main field which, in the magnetic case, cause much trouble in practice. The possibility of realizing a magnetic torsion balance, precisely analogous to the Eötvös gravity balance, is here considered as a method of eliminating temporal variations of the main magnetic field. It is shown that, whereas extreme sensitivity of measurement of local spatial variations of the magnetic field is theoretically possible with such an arrangement, the practical construction is rendered very difficult on account of the horizontal component of the main field; this exerts a prepondarating torque on the suspension fiber so long as any minute inequality of matching persists, as regards pole strength and axial direction, in the two magnets which are needed to provide the suspended system with equal, like poles at its extremities. Whereas the difficulty of matching these magnets with sufficient precision appears to preclude the possibility of constructing a portable magnetic balance of this type, it is shown that the principle can be applied to construct an extremely sensitive laboratory balance for the measurement of weak magnetic susceptibilities and work on these lines is proceeding.--Abstract reprinted from Science Abstracts, Section A, vol. 37, no. 434, 1934, p. 129, signed by E. L. J.

## (1943) PRINCIPLES OF APPLYING THE MAGNETOMETRIC THEORY FOR PROSPECTING FOR STRONGLY MAGNETIZED ORES AND FOR CALCULATING THEIR RESERVES (In Russian)

By R. V. Speransky

Razvedka Nedr, Moscow, no. 2, Jan. 1934, pp. 17-18

Speransky discusses the possibility of calculating the ore-reserves by mathematical interpretation of the profiles of the vertical and horizontal components of the anomalous field based on Bahurin's method (Magnetic Field of Bodies of Regular Shape from the Viewpoint of Magnetometric Studies--Geophys. Abs. 1 and 8). According to this method the ore-bodies existing in nature, may with a certain approximation be compared with those having regular shapes, as for example ellipsoids of rotation, elliptical cylinders, etc.

A successful attempt of such a mathematical interpretation was made in the area of iron ore deposits on the western shore of the bay of Kola.

Of course, the possibility of determining the qualitative properties of the ore by this method is excluded.--W. Ayvazoglou.

## (1944) RESULTS OF THE MAGNETIC SURVEY IN THE REZHEVSK URALS BAUXITE DEPOSITS IN 1932 (In Russian)

By M. Stupak

Razvedka Nedr, Moscow, no. 10, 1933, pp. 39-41

Technical equipment of the party consisted of: 1 Schmidt's vertical balance; 2 horizontal balances; 1 theodolite; 1 station for determining the variation; and 1 set of other geophysical implements.

In the first part to the article the author gives a geological description of the Rezhevsk bauxite deposits.

From the results of the magnetic survey Stupak established that:

1. The magnetic intensity over lenses not containing ore was normal.

2. Over lenses containing hematites only, the anomaly did not exceed 200 gammas.

3. Anomalies over lenses containing bauxite varied from 300 to 3000 gammas.

4. The anomalous effect was produced upon the Schmidt's horizontal field balance by the bauxites at various distances from the epicenter of the disturbing mass.

5. The magnetic field above the alluvial sediment varied within the limits of the accuracy of the instrument.

6. The determination of the contours of the ore lenses could be made, by using Schmidt's vertical balance, with an accuracy equal to about 3 meters.

7. The contacts between the alluval and eruptive deposits were registered by a sharp change in the intensity of the magnetic field.

8. The depth of the disturbing center, that is the depth of the lens could be shown by the method of constructing vectors by using the values obtained for H and Z.

In conclusion the author gives a comparison between the successes of the geological and geophysical prospectings carried out in the same region:

Geological prospecting party--investigated during 17 months an area of about 6-7 sq. km.; discovered 25 ore lenses with ore-resources to about 750,000 tons; the cost of the work was 700,000 roubles.

Geophysical party--investigated during 4 months 50 sq. km.; discovered 100 anomalies (65 percent proved by borings) with resources of ore amounting to 2.5 million tons; the cost of the work was 75,000 roubles.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1945) SONDERFÄLLE AUS DER PRAXIS DES SEISMISCHEN VERFAHRENS

(SPECIAL CASES IN THE APPLICATION OF SEISMIC METHODS)

By G. Brinckmeier

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 152-164

It has been demonstrated that a seismically well-defined stratum will, under certain circumstances, not be expressed in the travel time-curve of the first arrivals. Therefore, if only the time-curve of the first arrivals is taken into consideration errors in the calculation of depths up to 28 percent (in case of 3 strata) and 20 percent (4 strata) may occur.

The case is also discussed considering that a stratum has a lenticular shape, that is, that the upper and lower border surfaces are dipping against each other. Results indicate that it is difficult to distinguish the lenticular stratum from the underlying one.

Possibilities of how the errors may be avoided are mentioned.--Author's abstract.

### (1946) EARTHQUAKE NOTES

Edited by R. R. Bodle

Eastern Section, Seismological Society of America, Washington, D. C., vol. 5, no. 4, 1934, 8 pp.

A brief review of the following papers recently published is given: (1) The Seismograph Station at Montezuma, Chile; (2) The Utah Earthquake, March 12, 1934; (3) Indian Earthquake, January 15, 1934; (4) Annual Exhibit of the Carnegie Institution of Washington; (5) Strong-Motion Program; (6) Study of Seismograph Characteristics; (7) New Vibration Recording Instrument Successful; (8) Earthquake Insurance in New Zealand; (9) Earthquake Insurance in the United States; (10) Travel-time Tables; (11) A Law for Earthquake Safety; (12) Sea Waves Listed; (13) Studies of Earthquake Action Promise better Structures; (14) Personal; and (15) Epicenters.--W. Ayvazoglou.

## (1947) A STUDY ON THE INITIAL MOTION OF EARTHQUAKES

By Takeo Suzuki

Bulletin of the Earthquake Research Institute, Tokyo, vol. 12, no. 1, 1934, pp. 15-18

The author studies the beginning of an earthquake motion by comparing the records of the Ishimoto acceleration seismograph (see Geophys. Abs. 59, p. 1089) with those of the displacement seismograph.

Twelve earthquakes which originated near Tokyo were studied. The comparison was made with respect to the initial motion of vertical component only.

A few examples are shown in seismograms.--W. Ayvazoglou.

## (1948) LE TUNNEL DE GIBRALTAR. RÉCENTES INVESTIGATIONS GÉOPHYSIQUES

(THE GIBRALTAR TUNNEL. RECENT GEOPHYSICAL INVESTIGATIONS)

By Pierre Devaux

La Nature, Paris, no. 2922, Feb. 1, 1934, pp. 119-125

After a brief historical description of the project for constructing the Gibraltar tunnel and an explanation of the seismic methods for determining the underground structure the author discusses the seismic refraction methods applied for investigating the underground structure on both the shores of the Straits of Gibraltar. The work was carried on by José G. Sineritz. According to Sineritz it was proved by the geophysical investigations that on both shores of the Straits the depth of the strata impermeable to fluids is greater than 1000 m.

Measurings of water depths of the Straits carried out by most modern methods did not show depths over 400 meters. Thus from the technical viewpoint the construction of the tunnel is proved to be possible.--W. Ayvazoglou.

## (1949) DISCOVERY OF VALENTINE (LA ROSE) DOME, LOUISIANA, BY REFLECTION SEISMOGRAPH

By George S. Buchanan

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 18, no. 4, 1934, p. 543

In this note Buchanan answers the following question asked the writer a number of times: "Has reflection seismograph work been wholly responsible for a single discovery of a dome on the Gulf Coast of Texas or Louisiana, or have previous refraction work, torsion-balance work, or surface indications been primarily responsible?" In answer to this the author gives a definite case where the use of the reflection method of dip shooting was wholly responsible for discovery--the Barnsdale Oil Co. Valentine or La Rose prospect in Louisiana.

The work was difficult because of the vast swamp area. The actual time in the field was less than 3 months, and the area covered was 60,000 - 70,000 acres. The results had shown that a virgin area of considerable size can be explored by reflection seismograph.--W. Ayvazoglou.

### (1950) PORTABLE OUTFIT FOR DRILLING SHOT HOLES FOR EXPLOSIVES FOR SEISMOGRAPHS

By L. G. E. Bignell

Oil and Gas Journal, Tulsa, vol. 32, no. 44, p. 70, 1934

Bignell describes the recently designed automobile-type drilling rig for shot holes for explosives for seismograph exploration. This drilling unit weighs only 6,300 pounds (the portable drilling machine used customarily weighs as much as 11,000 pounds).

The work of this first unit is reported to have been very satisfactory. --W. Ayvazoglou.

## 4. ELECTRICAL METHODS

### (1951) ERGÄNZUNGEN ZUR BESTIMMUNG DES WAHREN WIDERSTANDES IM ERDBODEN NACH DEM ZENTRAL INDUCTIONSVERFAHREN UND DEM 4-PUNKTVERFAHREN

(SUPPLEMENTS FOR THE DETERMINATION OF THE TRUE RESISTANCE IN THE GROUND BY USING THE CENTRAL INDUCTION METHOD AND THE FOUR-ELECTRODE METHOD)

By J. G. Koenigsberger

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 201-216

Chapter 1. The central induction method for measuring the apparent resistance of the subsoil was continued with circular current circuits of radii (R) up to 800 m (J-curve), this investigation being preceded by a measurement with the four-electrode method of Wenner with an electrode separation of 1350 m. The combination of the two methods permits rather rapid calculation of the true resistance of the different layers. This is done now according to the new exact formula for $H_{90}$, which is represented graphically in a figure, giving the contribution to the value of $H_{90}$ for any layer at a depth h (R = 1). An example of the calculation is given in chapter 1.

The result, the true resistances of 8 layers, is given numerically and graphically in a figure. The influence of a small zone of higher conductivity is always larger than the influence of the layers of less conductivity. The upper layers give always a greater effect than the lower ones. The measurement with R = 800 m leads to the probability of a horizontal inhomogeneity, possibly a fault.

Chapter 2. The apparatus for the measurement was improved, especially the amplifier for low frequencies, by using mica condensators and best megaohm resistances. If the upper harmonics of the alternated current generator are not very weak (which may be checked easily), screening should be applied for the elimination of these disturbing effects. Remarks are made on the observations with circuits of many km radius for the calculation of the resistance at great depth and also for oil.

Chapter 3. The place of the inflection points in the J curve is shown for some layers in a graph, while the same was estimated by mathematical considerations.

Chapter 4. The use of the central-induction method for finding water in a desert is discussed. The appendix gives a short discussion on papers of H. Loewy concerning the application of the change of electric oscillations in antennae due to the presence of ground water.--Author's abstract.

## (1952) STUDIO DI UN PROFILO QUALSIASI DI SONDAGGIO ELECTRICO WENNER

## (STUDY OF PROFILES OF ANY NUMBER OF LAYERS BY WENNER'S ELECTRICAL METHOD)

By A. Belluigi

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 126-133

The author investigates the problem of the determination of the mean resistivity for "n" superimposed layers with parallel boundaries.

The case is approximated by comparing two superimposed layers with the multiple layer problem. The method is due for the investigation of the mean resistivity of two superimposed layers or of two layer groups. Graphs in the text show the effect of different influences on the mean resistivity. The example at the end of the article treats the case of two layers of equal magnitude and linear decreasing resistivity.--Author's abstract.

## (1953) THÉORIE DU PLAN CONDUCTEUR POUR L'EMETTEUR ALTERNATIF DE LONGUEUR FINIE

## (THEORY OF A CONDUCTING PLANE FOR AN ALTERNATING TRANSMITTER OF DEFINITE LENGTH)

By Stefanesco

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2,
1934, pp. 165-185

The idea of a conducting plane forms the foundation of geophysical methods of prospecting for structural studies by electro-magnetic induction (Sundberg). The theory of the conducting plane established by T. Levi-Civita for a linear primary current circulating in a cable of infinite length is extended by the author to the case of a cable of definite length. Approximation formulas similar to those given by J. N. Hummel and A. Rostangi for the infinite cable are also established. For the particular case of a perfect conducting plane a graphic table shows the variation in the inclination of the magnetic field on the median line of the cable in function of the depth of the conducting plane.

The use of the graphic table is shown on two examples.--Author's abstract.

## (1954) ERDSTROMMESSUNGEN BEI PFAFFENREUTH

## (EARTH-CURRENT MEASUREMENTS NEAR PFAFFENREUTH)

By J. B. Ostermeier

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2,
1934, pp. 186-200

A number of observations relative to earth-current measurements were made at the sulphurous deposits at Pfaffenreuth (Germany). The stations were spaced at regular distances of 5 meters. The potential differences at these points and the center point of this area, where one of the two nonpolarizing electrodes was placed, were determined in such a way that compensation of the earth current in both directions could be obtained. A suitable switch arrangement allowed to read immediately the compensated potential difference at the millivolt galvanometer. The observations were checked by a great many repetitions which gave a mean error amounting only to ± 2.6 mV; that is, 1 percent of the potential difference of -294mV between the maximum at the field of action and the undisturbed surrounding area. The boundaries of the deposit were indicated exactly by the equipotential lines.

The maximum value of the potential difference was shifted against the dip in an analogous way as the distribution of the potential by magnetical and gravimetrical investigations would show up. The well-known Maxwell rule for the determination of the direction of the electrical field also applies to this case when an inclination of $90^\circ$ is adopted.--Author's abstract.

## (1955) POTENTIAL GRADIENT VARIATION ON MARTHA'S VINEYARD

By C. H. Dwight

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 38, no. 4, December 1933, pp. 309-312

Continuous photographic record was made on 14 calm days in the summer of 1931 at a specially constructed hut on the flat plains of the island of Martha's Vineyard, Mass. Maxima occur approximately at midnight and at $14^h$; minima occur at about $4^h$ and $21^h$, agreeing in part with the times usually observed for the extremes of this element.--Author's abstract.

## (1956) ON THE PROBLEM OF THE PRESENT CONDITION OF ELECTROMETRIC METHODS OF APPLIED GEOPHYSICS AND THEIR APPLICATION IN THE FIELD OF NONFERROUS METALS

(In Russian)

By N. I. Sofronoff and P. F. Rodionoff

Problems of Soviet Geology, Leningrad, vol. 2, no. 4, 1933,
pp. 62-75

The following conclusions are drawn by the authors from the study of the conditions of the electrical methods of prospecting in the U. S. S. R. with regard to their application to the prospecting of nonferrous metals.

1. The possibility of applying the electrical methods in prospecting for deposits of nonferrous metals was confirmed by a series of practical achievements.

2. The quality of the geophysical prospecting work must be further developed.

3. The cooperation of geophysicists with the geologists is emphasized.--W. Ayvazoglou.

## (1957) ELECTROMETRY IN PROSPECTING FOR ORES

(In Russian)

By V. S. Borkov

Razvedka Nedr, Moscow, no. 8, 1933, pp. 36-37

A brief discussion on the progress in electrical methods of prospecting in the U. S. S. R. is given. According to the author 90 percent of the ore-deposit discoveries were made during the last years by geophysical prospecting. Electrical methods proved to be very successful if used in regions suitable for this method.--W. Ayvazoglou.

# (1958) EARTH-RESISTIVITY SURVEYS ON VARIOUS GEOLOGICAL STRUCTURES RELATED TO MINING

By Granville Poole, J. T. Whetton, and A. Taylor

Transactions of the Institution of Mining Engineers, London,
vol. 86, no. 6, 1934, pp. 312-335

Problem of tracing faults by geophysical methods is discussed under the following headings:

1. Initial difficulties connected with the problem.

2. Consideration of methods suitable for location of faults.

3. Considerations of earth-resistivity methods:

   (a) the step-traverse method; (b) the electrical vertical drilling or probe method.

4. Apparatus.

5. The 90 = fathom fault at Marden near Whitley Bay.

6. The 90 = fathom fault near Slatyford.

7. The new moor fault.

8. The Causey Park fault dyke.

9. The determination of hade.

According to the conclusions drawn by the authors from the present investigation the

> Existence of the fault is conclusively denoted by resistivity measurements, the procedure depending on the geological and topographical peculiarities of each case, which also account for the considerable variations in the nature of the fault indications. The important point to consider, however, is the fact that in nearly all cases indications of some sort will be given.
>
> The determination of the hade of a fault is a feature worthy of special consideration. The advantage of this will become of greater importance to those connected with mining and civil engineering developments as the application of geophysical surveying increases.

A brief discussion of the paper is added.--W. Ayvazoglou.

## 5. RADIOACTIVE METHODS

### (1959) TO THE QUESTION OF THE EMANATION-METHOD OF SEARCHING FOR RADIOACTIVE OBJECTS

(In Russian)

By A. P. Kirikov, P. Tverskoi, and A. Grammakov

Bulletin of the United Geological and Prospecting Service of
U. S. S. R., vol. 51, no. 84, 1932, pp. 1269-1282

The necessity of applying in searching for radioactive objects a more exhaustive method than the $\alpha$ and $\gamma$ methods compelled the authors of this paper to recur to the study of the question of the possibility of applying the emanation method in such cases. This study concerned the way of the radioactive emanation in the soil air, its distribution in a horizontal layer at some depth below the surface, and along the vertical, in connection with the possibility of carrying out an areal emanation survey. This exploration was carried out by photographic registration and systematic determination of the radioactivity of the soil air at different depths. The obtained results were compared with those of $\gamma$ survey and $\alpha$ measurements; they showed that under conditions of constant meteorological factors such a survey is wholly possible and may serve the aims of searching for radioactive objects. --Authors' Abstract.

### (1960) REPORT OF THE WORK CARRIED OUT BY THE KAVGOLOVO EXPERIMENTAL-METHODOLOGICAL PARTY IN 1931

By T. Bogoslovskaia, A. Grammakov, A. Kirikov,
and P. Tverskoi

Bulletin of the United Geological and Prospecting Service of
U. S. S. R., Leningrad, vol. 51, no. 84, 1932,
pp. 1283-1293

The experimental-methodological work in 1931 had for its object study of the distribution of emanation in a homogeneous medium (alluvium) under natural conditions to determine the depths at which the emanation method still gives favorable results. The observations performed showed that 30 kg of radioactive ore (being equivalent in concentration to 0.2 percent $U_3O_8$ in a state of equilibrium with decomposition products), and 90 kg of ore equivalent as to its concentration to 0.01 percent $U_3O_8$, buried in sand at a depth of 5 m below the surface, could be detected at a depth of 1 m from that surface.

Moreover, observations showed that the distribution at depth is ruled by the course of barometric pressure. Approximated calculations of the speed with which the emanation moved in a sand medium along the vertical toward the surface, resulted in values of the order of 60 cm per day.—Authors' abstract.

## (1961) THE CAPACITY OF EMANATION OF ORES AND ROCKS OF THE TABOSHAR URANIUM-RADIUM DEPOSIT. (In Russian)

By A. P. Kirikov, T. Bogoslovskaia and G. Gorshkov

Bulletin of the United Geological and Prospecting Service of
U. S. S. R., Leningrad, vol. 51, no. 84, 1932, pp.
1293-1299

Samples from the Taboshar deposit were taken and their capacity of emanation determined under conditions of emanation of radium, both in the air and in water. The samples were placed in hermetically closed glass vessels and the quantity of emanation was defined by the circulation method. The following conclusions were drawn by the authors:

1. The capacity of emanation of ores containing yellow uranium-phosphates was considerably greater than that of ores of torbernite types.

2. The capacity of emanation of ores and rocks in water was, in general, greater than in the air.

The capacity of emanation of ores and rocks increased with the decrease of the size of their fragments.--W. Ayvazoglou.

## (1962) CONCERNING THE QUESTION OF THE INFLUENCE OF IRREGULAR SEDIMENTATION AND FORMATION OF LAYERS OF THE SEDIMENTS UPON THE VELOCITY OF PROPAGATION OF RADIUM EMANATIONS WITHIN THEM (In Russian)

By G. V. Gorshkov

Journal of Geophysics, Moscow, vol. 3, no. 3, 1933, pp. 292-298

There is close connection between the structure of the alluvium and the velocity of propagation of radium within it. An irregular structure of the alluvium often causes irregular concentration of radium.

The author gives in this article the results of his studies of the influence of the porosity of the ground upon the velocity of propagation of radium.

Based on his experiments Gorshkov explains the dependence of the propagation of radon from the changes in the porosity of the ground.--W. Ayvazoglou.

## 7. UNCLASSIFIED METHODS

### (1963) URTEILE NORDAMERIKANISCHER PRAKTIKER DES BERGBAUES ÜBER DIE ANGEWANDTE GEOPHYSIK UND DESSEN ÖKONOMISCHEN NUTZEN

### (OPINIONS OF NORTH AMERICAN MINING EXPERTS ON APPLIED GEOPHYSICS AND ITS ECONOMICAL ADVANTAGES).

By J. G. Koenigsberger

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 217-222

This article refers to the publications (originals printed in the Transactions of the American Institute of Mining and Metallurgical Engineers, Geophysical Prospecting, 1932) of different North American mining experts on the utility of geophysical prospection.

The author of this review adds to this (in footnotes and in the text) some viewpoints regarding these discussions, of which an interesting one is the question whether it is better to conduct the geophysical research by a government or to leave it to private companies.--Authors' abstract.

### (1964) ANGABEN UND URTEILE ÜBER DIE LEISTUNGEN DER ANGEWANDTEN GEOPHYSIK IM RUSSLAND

### (DATA AND OPINIONS ON THE ATTAINMENTS OF APPLIED GEOPHYSICS IN RUSSIA)

By J. Koenigsberger

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 2, 1934, pp. 222-234

Geophysical methods of prospecting have been applied in the U. S. S. R. since 1924; the extent of this work increased considerably from year to year. The author gives figures showing the number of groups used in geophysical prospecting and costs of this work during the years 1928 to 1932:

Electrical Methods (equipotential-lines intensity, induction, polarization, resistivity methods); 1928--10 groups, 140,000 rubles; 1929--17 groups, 290,000 rubles; 1930--39 groups, 843,000 rubles; 1931--49 group, 1,450,000 rubles; 1932--59 groups, 2,290,000 rubles.

Magnetic Methods (Thalen-Tiberg apparatus and A. Schmidt's field balance): 1928--12 groups, 91,000 rubles; 1929--12 groups, 75,000 rubles; 1930--18 groups, 283,000 rubles; 1931--36 groups, 1,200,000 rubles; 1932--65 groups, 2,531,000 rubles.

Gravimetric Methods (Eötvös torsion balance and pendulum measurements); 1928--6 groups, 54,000 rubles; 1929--6 groups, 65,000 rubles; 1930--11 groups, 164,000 rubles; 1931--11 groups, 360,000 rubles; 1932--12 groups, 419,000 rubles.

Seismic Methods (refraction): 1930--5 groups, 108,000 rubles; 1931--6 groups, 350,000 rubles; 1932--7 groups, 478,000 rubles.

Radioactive and Geothermal Methods: 1928--5 groups, 200,000 rubles; 1929--7 groups, 31,000 rubles; 1930--6 groups, 29,000 rubles. There are no data for 1931 and 1932, but it seems that the application, especially of the geothermal method, has increased considerably.

Distribution of the costs with respect to salaries, transportation, amortization of apparatus, etc., is mentioned.

An outline of the productiveness of the work and of the cost per square kilometer for the different methods for the year 1932 is given.

Information and a brief historical outline on the geophysical work in Russia according to Petrowsky's publication is added.--W. Ayvazoglou.

## (1965) GEOPHYSICS
(In Russian)

Edited by W. P. Russakow

Western Regional Institute of Scientific Research, Smolensk,
Section of Physics, no. 1, 1932, 101 pp.

In the introduction to this new periodical magazine, Russakow emphasizes the necessity of studying atmospheric electricity, determining the content of radioactive substances in underground waters, in the soil, and in the air in connection with practical application of mineral fertilizers for agricultureal purposes, as, according to his statement, this branch of application of geophysics has so far been neglected entirely.

This first number of Geophysics contains the following series of articles on radioactivity of various substances involved in studying this problem:

1. Radioactivity of some phosphorites in western part of the U. S. S. R., by W. P. Russakow, pp. 5-6.

2. On the study of the radioactivity of phosphorites, by W. P. Russakow, pp. 7-13.

3. Radioactivity of phosphorites in the basins of the rivers Desna and Ivot, by A. G. Pogrebow, pp. 15-20.

4. On the question of the variation of radioactivity in water springs, by W. P. Russakow, pp. 21-26.

5. On the methods of calculating the radiation of the sun, by I. E. Efimow, pp. 27-34.

6. Amount of heat produced by the radiation of the sun for the city of Smolensk in 1930, by I. E. Efimow, pp. 35-42.

7. Daily course of the radiation of the sun in the city of Smolensk, by O. M. Dawidowitsch, pp. 43-50.

8. Transparency of the atmosphere of the earth and intensity of the radiation of the sun in the city of Smolensk according to observations made in 1930, by I. E. Efimow, pp. 51-70.

9. Daily course of the atmospheric pressure in the City of Smolensk according to the barograph registrations for the years 1926 to 1930, by S. E. Sokolow, pp. 71-78.

10. Meteorological observations made by the Observatory of the Smolensk Pedagogical Institute during 1930, by I. E. Efimow, pp. 79-96.

11. Radioactivity of the phosphorites in the basin of the river of Vetma, by S. I. Isaew, pp. 97-101.—W. Ayvazoglou.

## (1966) SOME DATA ON THE GEOPHYSICAL WORK IN THE URALS IN 1932

(In Russian)

By Krasulin

Razvedka Nedr, Moscow, no. 5/6, 1933, pp. 18-21

The author summarizes the work in the Urals in 1932 by the Geophysical Scientific and Research Institute in connection with the application of geophysics to prospecting for minerals.

In all 25 geophysical parties worked in the Urals during 1932 (10 - magnetometric, 9 - electrometric, 3 - gravimetric, 1 - pendulum, 1 - seismic, and 1 - radiometric.

The results of the application of geophysical prospecting for chromites, bauxites, and coal are given:

Chromites.- Gravimetric, magnetic, and electrical methods were applied. The possibility of the gravimetric method was proved; positive results were obtained from the magnetic method, and no definite results were obtained from electrical methods.

Bauxites.- Magnetic method was applied and the possibility of its application proved.

Coal.- Gravimetric, seismic, and electrical methods were tested. The orders of the Jurassic coal deposits were established at a series of points y the gravimetric method; new data concerning the geological structure in he region of investigation (Cheliabinsk) were obtained by the seismic method; he results of the electrical methods of prospecting in the Korkinsk lignite eposits were found to be satisfactory; The presence of coal was shown clearly nough by the electrical profiles; the borders of the coal zone were determined y the resistance maps; the deposits could be differentiated according to heir electrical properties.

The author mentions also briefly that the results of the magnetic surveys arried out for the discovery of platinum and of the radioactive surveys for rospecting for rare minerals were successful.--W. Ayvazoglou.

## (1967) GRAVITATIONAL AND MAGNETOMETRIC SURVEYS OF THE ONAKAWANA LIGNITE AND GRAND RAPIDS SIDERITE DEPOSITS

By A. H. Miller

Canadian Journal of Research, Ottawa, vol. 10, no. 4, 1934, pp. 463-478

A traverse about 3 miles long was made with a torsion balance over the lignite deposit at Onakawana in northern Ontario, where it has been outlined y extensive drilling over an area of a few square miles. The drilling shows hat it is overlain with 50 to 100 feet of boulder clay and is imbedded in retaceous clay of considerably greater density than the coal. The traverse rossed the seam in three places. At each crossing a definite lowering in he value of gravity was observed. The boundary of the deposit was shown long two parts of the traverse by the large, definite effect on the gradient of gravity. Owing to the fact that as a rule the stations were as far as 333 feet apart and the drill holes usually 1,000 feet or more apart, there is ncertainty at some stations regarding the respective gravitational effects of variations of the coal seam on the one hand and possible irregularities in he boulder clay on the other. The results indicate that the torsion balance ay be useful in outlining such deposits as the Onakawana lignite. The value of the instrument could be estimated better if it had been possible to make a more definite test of the effect of irregularities in the boulder clay.

Numerous magnetometer readings over and near the coal seam showed such slight variation that there appears to be little hope this instrument would be of use in prospecting for the coal, at least in so far as the immediate boundaries are concerned.

A preliminary survey of the Grand Rapids siderite deposit on the Mattagami River was made with vertical and horizontal magnetometers. The iron occurs in limestone which, except at the river, is buried beneath 50 feet or more of drift. The anomaly produced by the iron apparently does not exceed 100 $\gamma$ and is complicated by a larger and more regional anomaly which makes definite interpretation of the results difficult. A more detailed survey might produce useful results. Magnetometric traverses were made along the rivers from Grand Rapids to James Bay and from Williams Island in the Abitibi to its mouth. A similar magnetic anomaly to that at Grand Rapids was observed at Williams Island. There is quite a marked anomaly at Moose Factory.--Author's abstract.

## 9. NEW BOOKS

(1968) Bucher, Walter H., The Deformation of the Earth's Crust: An Inductive Approach to the Problems of Diastrophism. 518 pp., illustrated. Princeton University Press, London, Humphrey Milford. Price, 22s. 6 d.

(1969) Haalck, Hans, Lehrbuch der angewandten Geophysik (Handbook of Applied Geophysics). 376 pp., illustrated. Gebrüder Borntrâger, Berlin. Price RM. 24.

(1970) Koenigsberger, J., Aufsuchung von Wasser mit Geophysikalischen Methoden (Prospecting for Water by Geophysical Methods). Akademische Verlagsgesellschaft m. b. H. Leipzig, 63 pp. 22 figs., 1933, Price RM. 3.80. The application of geoelectrical methods in the search for water is described. References are abundant.

## 10. PATENTS

### (1971) BOREHOLE EXPLORING APPARATUS

The Geophysical Service Incorporated, assignee of
John C. Karcher, both of Dallas, Tex., U. S. A.

Canadian Patent 340260 Issued March 24, 1934

This invention refers to a method for continuously exploring boreholes during drilling; it consists in causing an electric current to flow through a conductor insulated from the drill stem of the hole-drilling mechanism and connected to the drill bit to induce the current to flow from the drill bit into the earth from which said current is collected, and then causing the current to pass through measuring instruments for observation.

Claims allowed - 7.

### (1972) PROSPECTING DEVICE

Shirl Herr, Crawfordsville, inventor, and
Raymond B. Abbott, Lafayette, assignee of one-half
of the interest, both of Indiana, U. S. A.

Canadian Patent 340828 Issued April 10, 1934

This invention relates to the method of prospecting underground regions from the surface of the earth to locate buried objects; producing a magnetic field by passing an electric current through a primary coil set up in an initial position; setting up a detecting coil at a substantial distance from the primary coil and in a position relative to said primary coil where the minimum current will be induced in the detecting coil; transferring said primary coil and said detecting coil to points in the territory to be prospected, the said two coils being set up at each point in the same relative positions, one in respect to the other, as was determined by the initial minimum setting; and observing the current output at each setting.

Claims allowed - 3.

## (1973) PROSPECTING FOR ORES AND CONDUCTING BODIES BY THE INDUCTION METHOD

A. P. Selesnev, U. S. S. R.

Russian Patent 90260 Issued July 31, 1933.

This invention relates to the electrical prospecting for ores by the induction method. It is characterized by an arrangement serving for minimizing the effect produced by the generator frame upon the receiving frame. An additional frame in which a working wave is incited is secured between them.

Claims allowed - 1.

## (1974) GRAVITATIONAL VARIOMETER

P. K. Nechiporenko and V. S. Fedukovich, U. S. S. R.

Russian Patent 99958 Issued July 31, 1933

This invention relates to an arrangement for damping the oscillations of the beam. The beam is made in the form of a hollow cylinder suspended to a thread passing along the axis of the beam; the beam is provided with a metallic ring placed in the field of action of magnets or electromagnets.

Claims allowed - 1.

## (1975) PROSPECTING FOR ORE BY THE METHOD OF MEASURING THE MAGNETIC FIELDS OF ALTERNATING CURRENTS PRODUCED IN THE EARTH

B. J. Shparberg, U. S. S. R.

Russian Patent 105017 Issued April 30, 1933

This invention refers to prospecting for ores by the method of measuring the magnetic fields, using a frame which takes a vertical position automatically. In the method described the frame is provided with a device recording the strength of the current. The device is brought in uninterrupted rotation around the vertical axis, and the points of the maximum amplitudes registered at the various points of observation are connected. From the curve obtained in this way conclusions are drawn on the properties of the magnetic field.

Claims allowed - 1.

## (1976) ELECTRICAL SEISMOGRAPH

A. P. Konstantinov, U.S.S.R.

Russian Patent 105846 Issued July 31, 1933

This invention relates to an electrical seismograph consisting of a generator and a resonance body. The capacity of the latter is so arranged that it can be changed by the effects of the shocks.

Claims allowed - 1.

## (1977) METHOD OF MEASURING THE COEFFICIENT OF THE MAGNETIC PERMEABILITY OF ROCKS

V. Pavlinov, U. S. S. R.

Russian Patent 113000 Issued June 30, 1933

This invention relates to a method of measuring the coefficient of the magnetic permeability of rocks in which two hollow spheres or ellipsoids, having their centers in the horizontal plane, are used; the spheres are filled with the rock to be investigated and a magnetic needle is secured between them. After this the spheres are turned around the needle, and the deviation of the needle caused by this is observed. From these observations the coefficient of the magnetic permeability of the rocks investigated is calculated.

Claims allowed - 1.

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G. A. No. 63 UNITED STATES BUREAU OF MINES July, 1934.

Scott Turner, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

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## 1. GRAVITATIONAL METHODS

### (1978) A NEW TORSION BALANCE FOR FAST AND ECONOMICAL SURVEYS

Editorial Notes

Canadian Mining Journal, vol. 55, no. 5, 1934, pp. 258-259

The Oil and Gas Journal, Tulsa, vol. 32, no. 51, 1934, p. 205

According to this note the new balance is much more compact than previous type torsion balances. It consists mainly of two enclosed balance beams which in the respective tubes have been mounted to a central cast-aluminum casing containing the optical equipment of the instrument.

The period of observation is 20 minutes only. The height of the instrument is about 4 feet, the weight being 85 pounds for full automatic operation and 55 pounds semiautomatic.

The sensitivity of the instrument is slightly smaller than that of the Askania Z-bar torsion balance.

Details on the instrument may be obtained from the American Askania Corporation, Houston, Tex.--W. Ayvazoglou.

### (1979) BEITRAG ZUR BERECHNUNG VON MINIMUM-STABPENDELN

(CONTRIBUTION TO THE CALCULATION OF MINIMUM BAR-PENDULUMS)

By A. Graf

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 67-72

Formulas for calculating minimum pendulums of any shape of cross-section of the knife-edge body are derived, and the appearance of two minima are discussed.—Author's Abstract (translated by W. Ayvazoglou)

### (1980) ZUR THEORIE ELASTISCHER PENDEL MIT BESONDERER BERÜCKSICHTIGUNG DES HOLWECK-LEJAYSCHEN STABPENDELS

(CONTRIBUTION TO THE THEORY OF ELASTIC PENDULUMS WITH SPECIAL CONSIDERATION OF THE HOLWECK-LEJAY'S BAR-PENDULUM)

By A. Graf

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 73-84

In this article the author derives exact formulas for the periods of oscillation of elastic pendulums at small amplitudes for both the suspended nd standing position of the pendulum. Pendulums of any arrangements of masses, engths of the springs, and shapes of the crosssection of the springs are considered.

The elastic point-pendulum and the elastic bar-pendulum are examined in etail, the latter especially with regard to Holweck-Lejay's quartz pendulum, lready constructed and tested in practice. The dimensions, as well as other ata, are calculated, and formulas for determining the constants of both the oint-pendulum and the bar-pendulum are derived, based on given examples. -Author's abstract (translated by W. Ayvazoglou).

## (1981) DIE MESSUNGEN DER ZEITLICHEN ÄNDERUNGEN DER SCHWERKRAFT

## (MEASUREMENTS OF THE SECULAR CHANGES OF GRAVITY

By R. Tomaschek

Ergebnisse der exakten Naturwissenschaften, vol. 12, 1933, pp. 36-81

The translation of Heinrich Jung's abstract of this paper, given in the eitschrift für Geophysik, vol. 10, no. 2, 1934, p. 118, reads as follows:

> After a brief discussion of various causes of the secular change of gravity relative to the earth's surface the author gives an outline on the theory of tidal variations of gravity for rigid as well as elastically flexible earth. In connection with this, the most important instruments which are used for measuring the secular changes of the direction of the plumbline and the absolute value of gravity are examined; these instruments are at the present time well-developed, making it possible to determine the direction of the plumbline with an accuracy up to $10^{-4}$ arc - sec. and the value of the gravity up to $10^{-8}$g.
>
> The author concludes with the discussion of the existing results of measurements, especially with regard to the elastic attitude of the earth as a whole, and of the influence of the cosmic movement of the earth upon gravity (Lorentz -contraction). The latter does not exist, as an effect hundred times smaller than that expected theoretically can be measured by instruments already in use.--W. Ayvazoglou.

## (1982) DETERMINAZIONE DI GRAVITA RELATIVA TRA L'ISTITUTO IDROGRAFICO DELLA R. MARINA IN GENOVA ED EREMO DI CHERASCO E BRIC TORNIOLA

## (DETERMINATION OF RELATIVE GRAVITY BETWEEN THE ROYAL NAVY HYDROGRAPHIC INSTITUTE IN GENOA AND EREMO DI CHERASCO AND BRIC TORNIOLA STATIONS

By Ida Gennaro

Atti di Torino, vol. 68, no. 1/3, 1933, pp. 52-64

The method applied for the measurements of the relative gravity between the station of the Hydrographic Institute in Genoa and Eremo di Cherasco and Bric Torniola stations is discussed.--W. Ayvazoglou.

## (1983) DETERMINAZIONE DI GRAVITA RELATIVA TRA L'ISTITUTO IDROGRAFICO DELLA R. MARINA IN GENOVA ED I VERTICI DI 1° ORDINE MONTE CREA E MONTE VESCO

(DETERMINATION OF THE RELATIVE GRAVITY BETWEEN THE ROYAL NAVY HYDROGRAPHIC INSTITUTE IN GENOA AND THE TOPS OF THE MOUNTAINS OF CREA AND VESCO)

By Ida Gennaro

Atti di Torino, vol. 68, no. 4/6, 1933, pp. 201-212

The results of the relative gravimetric measurements carried out in the Hydrographic Institute in Genoa and on Crea and Vesco Mountains are given. --W. Ayvazoglou.

## (1984) THE THEORY AND OPERATION OF THE EÖTVÖS TORSION BALANCE

By A. H. Miller

Journal of the Royal Astronomical Society of Canada, Toronto, vol. 28, no. 1, Jan. 1934, pp. 1-31

The article consists of three parts:

1. Introduction: Explanations are given on: (a) the curvature of the level surface--the horizontal directing forces--and (b) the curvature of the vertical--the gradient.

2. Theory of the torsion balance and the quantities it measures: (a) The gravitational potential; (b) the gravitational couple acting on a beam suspended by a fiber attached at a point above its center of gravity; (c) the gravitational couple acting on the torsion balance; (d) the horizontal directing tendency; and (e) the gravity gradient.

3. Measurement of gravitational effects with the torsion balance: (a) Single-beam instrument; (b) double-beam instrument; (c) observations in the field; and (d) determination of the instrumental constants.

Includes a list of publications dealing with the torsion balance and the theory in connection with it rather than with surveys and the application of the instrument is added.

Torsion-balance work in Canada is briefly mentioned.--W. Ayvazoglou.

### (1985) LES RECENTS PROGRES DE LA GRAVIMETRIE

### (RECENT ADVANCES IN GRAVIMETRY)

By Jean-Louis Lagrula

Revue scientifique, Paris, vol. 72, no. 5, March 10, 1934,
pp. 133-138

The fundamental principles of gravimetry are examined. A brief description of Holweck-Lejay's pendulum, its use in the field, and the interpretation of the results obtained is given.

Practical application of gravimetry to geological problems and prospecting is mentioned.--W. Ayvazoglou.

### (1986) BERECHNUNG VON GEOIDHEBUNGEN IN DEN ALPEN

### (CALCULATION OF THE GEOID-ELEVATIONS IN THE ALPS)

By Karl Mader

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 1, 1934,
pp. 56-85

Elevations of geoids in the Alps are calculated by means of complete formulas for the potential of finite three-edged and four-edged prismatic bodies under the assumption of noncompensated masses, and according to two hypotheses of isostasy. The deviations of the vertical are also computed for these cases. A scheme given by A. Prey serves as a model of the distribution of masses.—Author's abstract.

## 2. MAGNETIC METHODS

### (1987) TEKTONIK, ANOMALIEN DES ERDMAGNETISMUS UND ERDÖLHÖFFIGKEIT IN MITTEL DEUTSCHLAND

### (TECTONICS, ANOMALIES OF THE EARTH'S MAGNETISM, AND OCCURRENCES OF OIL IN CENTRAL GERMANY)

By R. von Zwerger

Kali, Berlin, vol. 28, 1934, no. 5, pp. 62-65; no. 6, pp. 72-75, no. 7,
pp. 86-88; no. 8, pp. 98-100 and no. 9, pp. 112-114

The magnetic "axes" of Thüringia indicate the vertical lines in the disturbing regions of the vertical intensity of the earth's magnetism. They may be explained as zones in which tectonic movements and deep-volcanic processes (connected genetically with them) took place. The latter produced a stiffening effect to a high degree. Intrusions were always the most essential causes for producing the highest degree of consolidation of the ground. Therefore the most important property of these deep-seated massifs is their greater stiffness and stability with respect to their surroundings. The carrier of this characteristic property is the crystalline rock; therefore these bodies are called crystalline massifs, even when the sedimentary rocks have taken part in their formation.

Their effect upon the history of the earth was a double one:

1. In the regions of the later German-type formation of mountains they partly formed disturbing rigid centers and partly they produced a frame effect.

2. During secular changes of the earth's crust they formed zones of undulations directed mainly upward and of resistance against secular sinking.

In practice this rule is valid, with some restrictions; the latter are discussed on an example of the Kyffhäuser-anomaly.

Owing to the orogenic undulations of the metalliferous mountain range of the Rhine direction and owing to the Hercynian cross-undulations the bottom of the Zechstein layer consists of different varieties and is not of a uniform level. From the viewpoint of oil geology the underground soles of the lower and middle Zechstein periods have practical interest: (1) Because they influence the formation of the borders of the facies of the Zechstein deposits, the separation of the main dolomite into horizons essentially different from each other, and the formation of the reefs; and (2) because they offer various possibilities for the formation of suitable oil traps in which the migrating oil and gas may be collected.

The Saxonian structure is decisive for the local accumulation of oil, which is more intensive at the borders of the deep-seated crystalline massif than in the depressed parts, but in the depressed parts it is stronger than directly over the massifs themselves. The regional migration of oil in Volkenroda takes place from the west (Selketrog) and not from the east (prolongation of the Kyffhäuser sole).

A list of 24 papers dealing with similar questions is added.--Author's abstract, translated by W. Ayvazoglou.

## (1988) THE PROSPECTS OF WESTERN REEFS

Editorial Note

South African Mining and Engineering Journal, Johannesburg,
vol. 45, no. 2172, 1934, pp. 58-59

The main objective of the magnetic survey started at the beginning of June 1933 was to investigate the general structure of the Witwatersrand formation by tracing the magnetic shale horizons. The shales have been traced successfully for about 11 miles, entailing 14,000 observations and comprising total traverse length of 210 miles. Several major faults have been traced, nd will have to be considered when future boreholes are located. -W. Ayvazoglou.

## (1989) EINE NEUE METHODE FÜR SEHR PRÄZISE MAGNETISCHE MESSUNGEN

## (A NEW METHOD FOR MAKING VERY ACCURATE MAGNETIC MEASUREMENTS)

By Th. Koulomzine and N. Bondaletoff

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 85-93

In this article the authors examine a new method in which the accuracy f measurements is improved without the necessity of using more complicated nstruments than those now employed. The sources of error taking place during he ordinary magnetic measurements are examined, and a working method is escribed by which the errors in measurement occurring during the usual ethods of work are eliminated. The main improvement consists in making trictly simultaneous measurements.

Good results were obtained in practice by considering the theoretical nvestigations of the errors.--Authors' abstract, translated by W. Ayvazoglou.

## (1990) ZUR FRAGE DER MIT DEM TEMPERATURKOMPENSIERTEN MAGNETSYSTEM ERREICHBAREN MESSGENAUIGKEIT

## (ON THE QUESTION OF THE ACCURACY OF MEASUREMENT ATTAINABLE WITH THE TEMPERATURE-COMPENSATED MAGNET SYSTEM)

By E. Kohl

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 93-94

During field measurements with the Askania Z-balance, provided with the rrangement for the compensating for the temperature, a mean "apparent ccuracy of measurement" equal to $\pm 2.50\ \gamma$, corresponding to a "mean error" f a single measurement equal to $\pm 3.26\ \gamma$, was attained.--Author's abstract, ranslated by W. Ayvazoglou.

## (1991) OBSERVATIONS MAGNETIQUES AU SCORESBY SUND PENDANT L'ANNEE POLAIRE

## (MAGNETIC OBSERVATIONS IN SCORESBY SUND DURING THE POLAR YEAR)

By J. P. Rothé

Comptes rendus de l'Academie des sciences, Paris, vol. 197, no. 19, 1933, pp. 1057-1059

The translation of Schmerwitz's abstract, published in Geophysikalische Berichte, 1934, page 59, reads as follows:

According to the observations made in the French polar station in Scoresby Sund a period of about 28 hours was established for both calm as well as earth magnetically disturbed days. H, Z, and D observed during the magnetic storm of August 5 are represented in a figure. The maximum deviation of the declination was 4°, while the disturbance observed at the same time in Val Joyeux was only 1°. The propagation of the earth-magnetic disturbances over the circumference of the earth, as determined from the comparison of the records obtained at other stations, requires about 1 minute.—W. Ayvazoglou.

## (1992) GEOPHYSICAL PROSPECTING

Editorial note

South-African Mining and Engineering Journal, Johannesburg, vol. 45, no. 2174, 1934, p. 146

This note mentions a paper, entitled "The Application and Limitations of Geophysical Prospecting Methods in the Witwatersrand Area", to be presented by Oscar Weiss at the meeting of the Chemical Metallurgical and Mining Society of South Africa which was to be held jointly with the Geological Society of South Africa on April 25, 1934.

This is the first of two papers in which the author intends to discuss the application of the magnetic, seismic, and gravimetric methods on the problems of the Rand.

The main items are as follows: 1, General introduction; 2, general theory of the earth's magnetism; 3, instruments; 4, the Hotchkiss superdip; 5, the vertical magnetic balance; 6, the new Lloyd-Schmidt magnetic balance, with temperature compensation; 7, the optical system; 8, the magnet system; 9, the effects of temperature and their compensation; 10, the knife-edge; 11, the auxiliary magnets; 12, the scale value; 13, base correction; 14, correction for diurnal variation and for magnetic storms; 15, correction for normal and regional variation; 16, correction for the indexes and auxiliary magnets;

7, field procedure; 18, accuracy; 19, costs; 20, application of the magnetic ethod on the Witwatersrand; 21, tracing magnetic shale beds; 22, the question of the strike; 23, the problem of the suboutcrop; 24, the problem of the ips; 25, locating dykes; 26, the determination of depths; 27, the problem f positive and negative anomalies; and 28, possible application of the eismic and gravimetric methods.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (1993) ÜBER DIE DEFORMATION DER ERDOBERFLÄCHE DURCH SCHERUNGSKRÄFTE IM HERD VON ERDBEBEN

### (ON THE DEFORMATION OF THE SURFACE OF THE EARTH CAUSED BY THE SHEARING FORCES AT THE FOCUS OF AN EARTHQUAKE)

By H. Gräfe

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 1, 1934,
pp. 17-26

Based on a simplified method, the corresponding deformations on the surace of the earth are examined for all possible positions of a shearing force n the focus of an earthquake. It is shown that in some cases a conclusion n the depth of the focus can be drawn from the appearance of the deformation. ll the considerations concern the shearing forces only.--Author's abstract, ranslated by W. Ayvazoglou.

### (1994) ÜBER SEISMISCHE OBERFLÄCHENWELLEN UND IHRE BEZIEHUNG ZUM GEOLOGISCHEN AUFBAU DES EURASIATISCHEN KONTINENTS

### (ON THE SEISMIC SURFACE WAVES AND THEIR RELATION TO THE GEOLOGICAL STRUCTURE OF THE EURASIAN CONTINENT)

By Walter V. zur Mühlen

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 1, 1934, pp. 26-40

This work is closely connected with the investigations near Rohrbach. In the first part of the article the author attempts to clarify the physical roperties of the seismic surface waves. The distance from the origin, the xistence and the propagation of the waves are examined. The second part eals with the relationship between the velocity of the surface waves and the geologic-tectonic structure of the subsoil. Differences appear clearly, ven within the continents. Isostasy phenomena within the Eurasian continent re indicated from calculations of the thickness of layers.--Author's abstract, translated by W. Ayvazoglou.

## (1995) BEOBACHTUNG DER BODENBEWEGUNG IN DREI KOMPONENTEN BEI SPRENGUNGEN

## (OBSERVATION OF THE THREE COMPONENTS OF THE MOVEMENT OF THE GROUND PRODUCED BY BLASTINGS)

By H. K. Müller

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 1, 1934, pp. 40-59

I. Instruments: The three-component apparatus used in observations is described: (a) Examination of the apparatus with regard to its proper oscillations; (b) determination of the magnification; (c) reproduction of the shock azimuths and oscillation azimuths by the H-component; (d) horizontal sensitivity of the vertical seismograph and vertical sensitivity of the horizontal seismograph; (e) testing of the seismographs on the terrain.

II. Observations: The present article deals with P-waves, S-waves, and surface-waves caused by blastings, particularly with the character of the movement of the ground produced by these three kinds of waves: Azimuth and angle of emergency of $P_I$, and $P_{II}$: (a) measurements on the Rhone glacier; (b) measurements on the ground of the Geophysical Institute in Göttingen; (c) measurements on the Hainberg and near Harste in the valley of the Leine. 2. The main movement: (a) movement of the ground having Rayleigh-type waves; (b) slightly dampened proper oscillations of the subsoil.

Eleven tables and thirteen figures complete the article.--W. Ayvazoglou.

## (1996) A SEMIGRAPHICAL METHOD OF DETERMINING DEPTHS OF MULTI-LAYER, DIPPING STRATA FROM SEISMIC TIME-TRAVEL CURVES

By Sidon Harris

American Journal of Science, New Haven, vol. 27, no. 157, 1934, pp. 13-23

The object of this paper is to describe a method of interpreting depths from seismic time-travel curves used by the writer on actual field data. No theoretical considerations are taken up, and no new mathematical formulas are developed. According to the author, the graphic method of solution is original and has not been described in the literature to date, thus a practical interpretation of seismic results is of interest.

From the results of investigations Harris concludes that to reach satisfactory conclusion as to the depths of consolidated deposits from refraction shooting it is necessary to shoot extensively over the area under consideration and then plot the entire data and arrive at approximate true velocities of the deeper beds before attempting computation of depths. Then each profile must be taken up separately and a rough contour of the subsurface bed of most interest sketched from the time-travel curves before actual calculations are begun.

In the example illustrated in this paper, six profiles were worked out and a subsurface contour map made of the limestone surface. The contour map showed a decided "high" in the surface of the limestone, which was later drilled into, and the difference between the well log and the calculated depth of the "high" was only 4 percent of the calculated depth.--W. Ayvazoglou.

## (1997) PHYSICAL METHODS OF EXPLORATION FOR OIL-BEARING STRUCTURES

By E. R. Shepard

Journal of the Acoustical Society of America, Lancaster, vol. 5, no. 1, 1933, p. 63

A paper on physical methods of exploration for oil-bearing structures was presented by Shepard at the symposium on sound ranging in a program of the ninth meeting of the Acoustical Society of America held in Washington at the Bureau of Standards on May 1, 1933.

A detailed description of the seismic method, particularly as it is used for determining the location of oil-bearing salt domes on the Gulf coast, is given. In this method a charge of dynamite is exploded in the ground, and the resulting waves through the earth are picked up by geophones at several points and recorded on an oscillograph film.

Because of the relatively high velocity of the waves through salt and stone, such mediums are easily detected.--W. Ayvazoglou.

## (1998) GEOPHYSICAL PROSPECTING FOR OIL

By Maurice Donnelly

Petroleum World, Los Angeles, vol. 31, no. 1, 1934, pp. 25-30

In this article the author, after having mentioned some fundamental principles of various methods of geophysical prospecting, discusses the technique of the seismic method (reflection and refraction). The explanation is illustrated by a few figures.--W. Ayvazoglou.

## (1999) THE PROPAGATION OF THE LONGITUDINAL WAVES PRODUCED BY THE LONG BEACH EARTHQUAKE

By B. Gutenberg

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 1, 1934,
pp. 114-120

The travel-times of the direct longitudinal waves produced by the earthquake of March 11, 1933 in southern California correspond within 1 to 2 seconds to the corrected values given already by Jeffreys. The apparent velocities calculated directly from the observations at the stations agree with the values found by Gutenberg and Richter; according to this, the wave velocity in the upper part of the sima at a depth of from 40 to 80 km is nearly constant and begins to increase without discontinuity down to the border of the mantle of the earth and the intermediate layer (at about 1,000 km of depth). --Author's abstract, translated by W. Ayvazoglou.

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## 4. ELECTRICAL METHODS

## (2000) APPLICATION DES TECHNIQUES ELECTRIQUES AUX PROBLEMES DE PROSPECTION ET D'ÉTUDES GÉOLOGIQUES

### (APPLICATION OF ELECTRICAL TECHNIQUE TO THE PROBLEMS OF PROSPECTING AND GEOLOGICAL STUDIES)

By P. Charrin

Extract from Bulletin de la Société Francaise des Electriciens,
Bar-le-Duc, no. 34, October 1933, pp. 1-31

The article consists of two parts.

Part 1: Principles of electrical methods of prospecting.

The place occupied by the electrical methods among the various other geophysical methods of prospecting is briefly mentioned. The following electrical methods are discussed;

(1) Spontaneous polarization; (2) methods dealing with electromagnetic fields; (3) methods dealing with electrical fields (potential method, resistivity method, electrical sounding); (4) alternating and direct currents.

Part 2: Application of electrical methods of prospecting.

(1) for geological studies; (2) in engineering; (3) in hydrology; (4) for the search of metallic deposits, and (5) in the electrical coring.--W. Ayvazoglou.

# (2001) SUR L' APPLICATION DES MESURES DE RESISTIVITE ELECTRIQUE DU SOUS-SOL AUX PROBLÈMES STRATIGRAPHIQUES ET TECTONIQUES

## (ON THE APPLICATION OF MEASUREMENTS OF ELECTRICAL RESISTIVITY OF THE SUBSOIL TO STRATIGRAPHIC AND TECTONIC PROBLEMS)

By R. Pavans de Ceccaty

Bulletin de la Société géologique de France, ser. 5, vol. 2, 1932, pp. 29-43

The author examines in this paper the factors on which the electrical resistivity of rocks depends mainly.

The three conditions of rocks by which the conductibility of rocks is affected, that is:

1. The relation of the volume occupied in the rocks by the imbibed water to the total volume of the rock;

2. The content of ions of various nature in the imbibed waters; and

3. The relative facility with which the ions may be displaced are discussed.

The problems which may be investigated by the resistivity methods are summed up as follows:

1. Determination of the thickness of one or several horizons of stratigraphical series;

2. Localization of faults and of the extent of their displacements, determination of anticlinal and synclinal axes, determination of the ancient continental topography lost under the covering.

3. Localization and explanation of major changes of the ground at great depths.

4. Lithological problems.

The applications resulting from the solutions of these problems are discussed.

Finally, the author draws the conclusion that the geophysical methods of prospecting, especially the resistivity methods, must be regarded by the geologists as means for contributing to their work of geological exploration in general. A list of publications is added.--W. Ayvazoglou.

## (2002) ATMOSPHERIC ELECTRIC OBSERVATIONS

By A. R. Hogg

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 1, 1934,
pp. 1-31

Results of atmospheric electric observations at the Commonwealth Solar Observatory, Canberra, Australia, show:

1. A diurnal maximum of potential gradient 3 to 4 hours later in universal time than the maximum over the oceans (Carnegie observations).

2. A diurnal maximum of air-earth current simultaneous with the maximum over the oceans.

3. A local variation of conductivity accounts for the difference in time of maximum gradient at the observatory and over the oceans.

4. Changes of the rate of ionization and nucleus concentration determine the daily march of the conductivity.

5. A diurnal maximum of the rate of ionization at about the same universal time as that at Glencree and Washington.

6. Various relationships between conductivity, nuclei, intermediate ions, small ions, etc., and meteorological phenomena.

7. The intermediate ions carry unit electronic charges.

8. The ratio of the numbers of intermediate and large ions varies with the meteorological conditions.

Seven figures are included.--Author's abstract.

## (2003) DIE GEOPHYSIKALISCHEN UNTERLAGEN DER ELEKTRISCHEN WASSERSUCHE

## (GEOPHYSICAL FOUNDATIONS OF ELECTRICAL SEARCH FOR WATER)

By H. Reich

Zeitschrift der deutschen geologischen Gesellschaft, Berlin,
vol. 85, no. 7, 1933, p. 475

This paper was presented at the "Grundwasser-und Minerallquellentagung" (Underground-water and mineral-spring session) in Frankfurt-am-Main, May 25 to 28, 1933.

The translation of the abstract of the paper published in the above-entioned magazine reads as follows:

> Owing to the differences of the physical properties of rocks, the latter can be determined by geophysical methods. The electrical conductibility of rocks depends most on the water contained in them. Thus, the conductibility becomes a very sensitive indicator of water conduction.

Three factors are important here:

1. The volume of pores, in percentage;
2. The filling of water in the pores, in percentage;
3. The electrolytic content of water.

A great variety of causes of the electrical conductibility of rocks esults from these factors. For example, rocks with a small content of lectrolytic water may have the same conductibility as those with a large ontent of very pure water. Owing to this, the electrical investigations or water may, in general, be interpreted in many ways. But, according to umerous investigations carried out, especially in boreholes, it is definitely stablished that in the single geological layers there usually exists a pecific and remaining constant, electrical conductibility. Therefore, if ll the geological facts are taken into consideration, an advantagoous appliation of electrical methods of prospecting for the search of water is arranted.--W. Ayvazoglou.

## (2004) APPARATE UND METHODEN DER ELEKTRISCHEN WASSERSUCHE

## (APPARATUS AND METHODS FOR ELECTRICAL PROSPECTING FOR WATER)

By A. Ebert

Zeitschrift der deutschen geologischen Gesellschaft, Berlin,
vol. 85, no. 7, 1933, pp. 496-500

The article was presented by Ebert at the Grundwasser-und Mineralquellenagung (underground-water and mineral-springs session) in Frankfurt-am-Main, ay 25 to 28, 1933.

The author emphasizes that knowledge of the geological structure of the ubsoil is necessary for practical determination of underground water by lectrical prospecting methods.

It must be known whether the water is of underground origin or is colected in fissures, as the geophysical methods of prospecting to be applied n various cases differ. The radioactive method may be applied with success f the thickness of the overburden is small (not over 30 meters).

For deeper lying horizons the electrical method is more suitable.

The author describes briefly various electrical methods by which the underground horizons may be traced (resistivity method; Wenner-Gish-Rooney's method with Lee's arrangement; Eve and Keys' method; Haalck and Ebert's method, and Nunier and Koenigsberger's method).

The author concludes that the resistivity methods are suitable for explaining many geological and hydrological problems.—W. Ayvazoglou.

## (2005) WUNSCHELRUTE UND WASSERSUCHE

## (DIVINING ROD AND SEARCH FOR WATER)

By Franz Michels

Zeitschrift der deutschen geologischen Gesellschaft, Berlin,
vol. 85, no. 7, 1933, pp. 501-504.

This question was brought up by the author at the Underground-water and mineral-springs session of the German Geological Society at Frankfurt-am-Main May 25 to 28, 1933, because partisans of the divining rod during the last year again became active, claiming also that they have discovered some earth-rays injurious to health which may be traced by the divining rod. The activity of these partisans naturally resulted in scientific research on the divining-rod question. Michels mentions a series of exact tests by scientists of the results claimed by adherents of the divining rod and gives examples proving the failure of the divining rod as a scientific instrument.

As a result of these investigations and of the papers delivered by Reich and Ebert (already cited), the following unanimous resolution was passed by the society concerning the use of public money for the search for water by means of the divining rod:

> We consider it necessary that the following rules shall be issued by the order of the government and country authorities:
>
> 1. All government and municipal authorities who proceed with borings or diggings for water based on the statements made by the divining-rod prospectors should obtain these statements in writing before the beginning of the work.
>
> 2. After completion of the work, a copy of the statements made and a report on the results of the work and on the cost of it should be delivered to the supervising authority.
>
> 3. These reports should be forwarded yearly to a central place which is to be determined; for example, to the Department of the Interior.—W. Ayvazoglou.

## 5. RADIOACTIVE METHODS

### (2006) CONTINUOUS MEASUREMENTS OF THE VIRTUAL HEIGHTS OF THE IONOSPHERE

By T. R. Gilliland

National Bureau of Standards Journal of Research, Washington, D. C.,
vol. 11, no. 1, 1933, pp. 141-147

This paper reports continuous measurements of the virtual heights of the ionized regions of the upper atmosphere. Short pulses of radio-frequency nergy are sent out by a transmitter operating on 4,100 kc per second. The ime interval required for the pulses to go up to the ionosphere and back is recorded photographically in the same room by means of an oscillograph. The ircuit diagram of the transmitter is included. The results of observations re discussed and shown in 11 figures.—W. Ayvazoglou.

### (2007) NOTE ON A MULTIFREQUENCY AUTOMATIC RECORDER OF IONOSPHERE HEIGHTS

By T. R. Gilliland

National Bureau of Standards Journal of Research, Washington, D. C.,
vol. 11, no. 4, 1933, pp. 561-566

A system is described which gives a curve of virtual height of the ionosphere against frequency. The pulse method of Breit and Tuve is employed ith modifications.

Records are presented which show the characteristics for different times f day and night.

According to the author, the system described offers a more convenient ethod than the manual methods previously employed, and greater economy in oth time and personnel is obtained. It is also possible to obtain records ith much greater detail.—W. Ayvazoglou.

### (2008) DIE HÖHENVERTEILUNG DER ERD,-LUFT-UND HÖHENSTRAHLUNG

### (THE ALTITUDE DISTRIBUTION OF THE EARTH RADIATION, AIR-RADIATION AND COSMIC RADIATION)

By G. A. Suckstorff

Zeitschrift fur Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 95-111

Measurements of cosmic radiation in the troposphere were carried out at an altitude up to 8,300 m. To avoid the influence of earth radiation, the flights were made over the Baltic Sea. The earth radiation was examined by measurements made on the radio towers in Witzleben and Königswusterhausen; an absorbing effect of the towers was established. According to the two series of measurements obtained, it was proved that the air radiation, which usually was neglected at altitudes over 5000 m, attained very great values, up to 30 percent, of the total ionization.—Author's abstract, translated by W. Ayvazoglou.

### (2009) ERDSTRAHLUNGSMESSUNGEN IN BAD NAUHEIM NACH DER GAMMASTRAHLEN METHODE

### (MEASUREMENTS OF EARTH-RADIATION IN THE RESORT NAUHEIM BY THE GAMMA-RADIATION METHOD)

By V. Masuch

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 2, 1934, pp. 112-118

The distribution of the intensity of $\gamma$-radiation in Nauheim was measured by two radiation apparatuses. A discussion of the results in connection with geology is given. The activity of the brine, the drinking well, and of the Usawater is determined. The intensity was found to be very high in sinter deposits, while the proper waters were of very low activity. --Author's abstract, translated by W. Ayvazoglou.

### (2010) SOME OBSERVATIONS OF THE AVERAGE LIFE OF SMALL IONS AND ATMOSPHERIC IONIZATION EQUILIBRIA

By A. R. Hogg

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 1, 1934, pp. 32-55

A modification of Schweidler's method II for determining the average life of small ions is suggested. Using this modification, the discrepancy between the observations by method I and method II disappeared.

The diminution constant was not proportional to the concentration of the nuclei. This was explained by the presence of doubly charged large ions, and an equation expressing the atmospheric ionization equilibrium was formulated.

Tentative values for several ionic recombination coefficients were calculated.

The relations between the diminution constant and meteorological conditions were investigated.—Author's abstract.

## 7. UNCLASSIFIED METHODS

### (2011) HORIZONTALSICHT BEI ÖRTLICH VERÄNDERLICHER TRÜBUNG UND BELEUCHTUNG
### (HORIZONTAL VISIBILITY DURING THE LOCAL VARIABLE TURBIDITY AND ILLUMINATION)

By H. Steinhäusser

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 1, 1934, pp. 59-65

Formulas for the azimuthal distribution of the horizontal visibility rom different places are derived under special assumptions on the local ependence from the coefficient of extinction and illumination.--Author's bstract, translated by W. Ayvazoglou.

### (2012) LES METHODES DE LA GEOPHYSIQUE APPLIQUEES AUX RECHERCHES MINIÈRES ET AU GÉNIE CIVIL

### (GEOPHYSICAL METHODS AS APPLIED TO PROSPECTING FOR ORES AND TO ENGINEERING)

By R. Maillet and P. Charrin

Extract from the Bulletin de la Societe belge des ingenieurs et des industriels, Brussels, no. 7, 1933, 36 pp.

Part one of the article deals with the principles of the various methods f geophysical prospecting.

In the second part the authors discuss the application of the geophysical ethods. Some examples on prospecting at shallow depth, and problems conected with engineering, hydrology, study of large sedimentary basins, and etallic deposits are examined.--W. Ayvazoglou.

### (2013) GEOLOGIC PROBLEMS OF THE BEARTOOTH-BIGHORN REGION

By W. H. Bucher, W. T. Thom, Jr., and R. T. Chamberlin

Bulletin of the Geological Society of America, Washington, vol. 45, no. 1, 1934, pp. 167-188

The article consists of the following three parts:

Part I. Structural problems: In this part, written by Bucher, he discusses a series of problems presented by the tectonic and magnetic history of the region described.

Part II. General chronologic problems, by Thom. In this part the author discusses the "fourth dimensional", or geochronologic aspects of the tectonic problems which must be solved in order to understand sequence, dates, relative magnitude, extra regional correlation, and tectonic importance of the several deformational movements which have affected the area.

Part III. Problems of basement structure, by Chamberlin. This part contains the geophysical means of investigation applied to the region. They are discussed under the following headings:

I. Structural conditions (determined by seismic methods):

(1) Depth of the sediment-filled basins (Bighorn and Powder River);

(2) attitude in space, and depth beneath surface, of the major thrust planes;

(3) presence of high-angle faults in the crystalline basement;

(4) shape of selected major intrusive bodies;

(5) thickness of volcanic cover in the Yellowstone region.

II. Gravitative conditions (determined by geodetic methods):

(1) Value of gravity and the anomalies at properly spaced points;

(2) density of rock materials.

A figure showing the section across Bighorn mountains, Powder River Basin, and Black Hills, including 20 gravity stations, is added. --W. Ayvazoglou.

### (2014) LES APPLICATIONS DES METHODES GEOPHYSIQUES AUX COLONIES

### (APPLICATION OF GEOPHYSICAL METHODS IN THE COLONIES)

By C. Schlumberger

La Chronique des mines coloniales, Paris, vol. 2, no. 12, Mar., 1, 1933, pp. 181-183

This is a summary of a lecture delivered by Schlumberger at a conference in the museum held from January 17 to February 9, 1933. The lecture was divided into two parts:

I. Summary of the various geophysical methods of prospecting (gravitational, magnetic, seismic, electrical, and others).

II. Problems attempted to be solved by geophysics (general geological reconnaissance; in connection with engineering; prospecting for water; prospecting for salt, oil, coal, iron, etc.).

The author concluded that although the geophysical methods of prospectng were not much applied in the colonies yet, their application is certainly eveloping as it makes it possible to solve problems for which the ordinary eological investigations are ineffective.--W. Ayvazoglou.

## (2015) GEOPHYSICAL WORK HINDERED BY GEOLOGICAL CONDITIONS IN CALIFORNIA

By Brad Mills

The Oil Weekly, Houston, vol. 73, no. 10, 1934, pp. 22-23

The limited success of geophysical methods in several districts in alifornia is explained by the author by the geological conditions of the ountry, such as absence of good reflecting beds, poor contrast in formaions, and deep accumulation of recent deposits. The change from one formaion to another often is so gradual that definite markers cannot be obtained.

A number of places in which geophysical work has been carried out are iven. Gravitational and seismic methods were mostly tested, and although his work is still in the experimental stage the interest in geophysical ork in California oil development is gaining steadily.--W. Ayvazoglou.

## 9. NEW BOOKS

2016) Conrad, V. and Weickmann, L. - Ergebnisse der kosmischen Physik mit Einschluss der Geophysik (Results of cosmic physics including geophysics). Leipzig, Akademische Verlagsgesellschaft m. b. H., vol. 2, 1934, 364 pp., 102 figs., and maps. Price, R. M. 35.00.

The following contributions to this book may be obtained separately: 1. Mechanics and thermodynamics of stationary glaciers, by M. Lagally, pp. 1-94; price, R.M. 7.00; 2. The ionizing balance of the atmosphere, by Victor Hess, pp. 95-152; price R.M. 5.00; 3. Results of gravity measurements on the sea during 1923 to 1932, by F. A. Vening Meinesz, pp. 153-212; price, R.M. 5.00; 4. The seismological laboratory in Pasadena, by B. Gutenberg, pp. 214-237; price, R.M. 3.00; 5. Distribution of the direction of the cosmic radiation, by W. Kolhörster and L. Tuwim, pp. 238-302 (this part is available, together with parts 2 and 3 of vol. 1, for R.M. 12); 6. On the earth-vortex, echelon faults, and allied phenomena, by S. Fujiwhara, T. Tsujimura, and S. Kusamitsu, pp. 303-364; price, R.M. 7.00.

## 10. PATENTS

### (2017) RELATIVE GRAVITY-VALUE MEASURING APPARATUS

The Standard Oil Development Co., New York City, N. Y., assignee of
Ludwig E. Blau, Houston, Tex., both in the U. S. A.

Canadian Patent 340813 Issued Apr. 10, 1934.

The invention relates to an apparatus for measuring relative values of gravity, comprising two bars attached to each other at their center at an angle, a beam, a pair of inextensible filaments for suspending the beam from one of the bars, a second pair of filaments, one end of each filament being connected to the second bar, means for yieldingly connecting the other end of the second pair of filaments to the beam, and means for recording the rotational deflections of the beam due to changes in gravity.

Claims allowed - 12.

### (2018) ELEKTRISCHES VERFAHREN UND ANORDNUNG ZUR BESTIMMUNG VON PORÖSEN, DURCH EIN BOHRLOCH DURCHSCHLAGENEN SCHICHTEN

### (ELECTRICAL METHOD AND APPARATUS FOR DETERMINING POROUS LAYERS PENETRATED BY A BOREHOLE)

(Société de prospection électrique procédés Schlumberger in Paris

German Patent 592351 Issued Feb. 7, 1934.

This invention refers to the method of determining porous layers penetrated by boreholes by means of electrical probe measurements at various depths lowered in the pipeless part of the hole filled with water. The potential differences produced by the circulation of the waters through the porous layers, without the use of any artificial electric current conducted into the subsoil, are measured.

Claims allowed - 4.

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G. A. No. 64

DEPARTMENT OF THE INTERIOR

August, 1934.

UNITED STATES BUREAU OF MINES
John W. Finch, Director

GEOPHYSICAL ABSTRACTS
MINING DIVISION

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# ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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## 1. GRAVITATIONAL METHODS

### (2019) DIE NEUEN GEOIDE

### (THE NEW GEOIDS)

By Robert Schwinner

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 2, 1934, pp. 213-224.

The geoids calculated by Ackerl and Hirvonen are, so to say, negatives of each other. According to Ackerl the continents are +(elevation of the geoid over the level-spheroid), the oceans are -(depression); according to Hirvonen the contrary is true; besides, the undulations in Ackerl's representation make as many hundreds of meters as they make tens in Hirvonen's. The reason is: Ackerl reduces in conformity with Prey, Hirvonen on the contrary according to the "free-air" method; he, however, presumes the isostasy, while Ackerl's statement corresponds to a not compensated relief. In spite of this contrast in principles, the foundations of which are still questionable, from both the statements it can be deduced that an ellipsoid with three axes is not fit for the approximation of the figure of the earth. The larger part of the surface of the earth differs only unessentially (unsystematically) from the spheroid of rotation, having only on one side an enormous "depression", the Pacific Ocean. Its remarkableness is proved geophysically and geologically. It is not only isostatically compensated but it may even be overcompensated. At any rate Hirvonen's hypothesis is here adequate, as his statement is more conformable to the geologist also in its details.--Author's abstract.

### (2020) A COMPARISON OF ISOSTASY IN INDIA AND IN THE UNITED STATES AND SOUTHERN CANADA

By William Bowie

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 2, 1934, pp. 250-259.

The comparison of isostasy in India and in the United States and southern Canada is shown by various data given in two figures and a series of tables. According to these data a conclusion is drawn that the isostatic condition of the crust under India seems to be in every way like that under the United States and the southern part of Canada. These comparisons cover the distribution of anomalies, for individual stations and sections, within given limits of size, and the mean isostatic and Bouguer anomalies with regard to sign for the individual sections and for the zones.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (2021) ERDMAGNETISMUS UND SAXONISCHE TEKTONIK

### (EARTH'S MAGNETISM AND THE SAXONIAN TECTONIC)

By H. Reich

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 85, no. 8, 1934, pp. 635-646.

In addition to his previous works on earth's magnetism, Reich gives in his article the results of measurements made by him in the region of the ell-known Saxonian tectonic. From these results it is possible to observe he relations between the geological bodies by which the disturbances are aused and the sedimentary structure; besides hypothetical considerations on he probable relationships may be drawn. Contents of the article are: . General assumptions; II. Single results: (1) The western Westphalia: (a) easurements and results; (b) relations to the tectonic; (c) relation to the edimentation; (2) Schleswig-Holstein: (a) measurements and results; (b) reations to the tectonic; (c) relations to the present time-surface formation.

A list of publications is added.--W. Ayvazoglou.

### (2022) MAGNETOMETRIC INVESTIGATIONS OF THE PRE-CAMBRIAN IRON-ORE DEPOSITS IN THE WESTERN PART OF THE U.S.S.R. (IN RUSSIAN)

By A. A. Strona

Razvedka Nedr, Moscow, no. 2, January 1934, pp. 46-48.

The author emphasizes the necessity of a detailed investigation of the region of the Kursk magnetic anomaly over an area of about 67,000 square ilometers.

The following is recommended:

1. To make investigations, by using Tiberg-Thalen magnetometer, along the lines of longitudinal direction at 5 kilometers distance one from another and at stations 100 meters apart, over the whole area.

2. Detailed magnetometric investigations along the lines of longitudinal direction 1 kilometer apart, and at stations 100 meters apart, over the area where the highest anomaly is observed (about 10 percent of the whole area).

3. Detailed investigations over the areas suitable for mining (about 20 percent of the area mentioned in paragraph 2).

4. Accurate magnetic measurements (Z and H by using Schmidt's variometer) along the profiles in the northeastern direction; the total length of this profile being about 6,000 km.

The work can, according to Strona's estimation, be carried out in 2 or 3 years at a cost of 300,000 to 400,000 rubles.--W. Ayvazoglou.

## (2023) MAGNETIC MEASUREMENTS ON AURIFEROUS VEINS IN BRAZIL

By Mark C. Malamphy

American Institute of Mining and Metallurgical Engineers, New York,
Geophysical Prospecting Contribution No. 72, 1934, 12 pp.

The abstract of this paper published in Mining and Metallurgy, vol. 15, no. 330, p. 263, reads as follows:

One of the lesser-known gold-bearing regions of Brazil is in the vicinity of Lavras, in the State of Rio Grande do Sul. Recently the Companhia Estrada de Ferro e Minas Sao Jeronymo has been making a detailed survey of the area, and the author of this paper was requested to study the possibility of applying geophysical methods. The present paper gives a few details of work and the results obtained. The problem was difficult and the results not particularly brilliant, according to the author, but the data are believed to represent another advance in the application of the magnetic method of prospecting.

The instrument used was a Schmidt-Lloyd vertical magnetic field balance made by Askania Werke. It did not prove of value for the discovery of auriferous veins of the type found there. It is believed, however, that fair results may be expected when studying the continuation of veins that disappear under alluvial covering. The data thus obtained should be of exceptional value in directing the excavational work of prospecting.

A short appendix to the paper gives the results of magnetic observations in the Sao Jeronymo coal mine.

## (2024) THE POSITION AND PROSPECTS OF MID WITS

Editorial Note

South African Mining and Engineering Journal, Johannesburg, vol. 45,
no. 2175, 1934, p. 212.

In discussing the position and prospects of Mid Wits, the author of this note mentions the magnetometric survey carried on since August 1933 by Dr. Heimburg, Up to December 31, 190 miles of section lines were completed and 3,000 stations surveyed.

The sub-outcrops of the Main Reef are expected at a depth of about 3,500 feet, dipping about 20° to 25° to the southeast.--W. Ayvazoglou.

## (2025) THE APPLICATIONS AND LIMITATIONS OF GEOPHYSICAL PROSPECTING METHODS IN THE WITWATERSRAND AREA

By Oscar Weiss

Journal of the Chemical, Metallurgical and Mining Society of South Africa,
Johannesburg, vol. 34, no. 10, 1934, pp. 321-361.

In this paper the writer presents in a compact form, but covering all details, the theory and practice of the magnetic instruments and methods used or to be used on the Rand. The following are the main items: (1) General introduction; (2) general theory of the earth's magnetism; (3) instruments; (4) the Hitchkiss Superdip, its theory, adjustment, and practice; (5) the vertical magnetic balance; (6) the new Lloyd-Schmidt magnetic balance with temperature compensation; (7) the optical system; (8) the magnet system; (9) the effects of temperature and their compensation; (10) the knife-edge; (11) the auxiliary magnets; (12) the scale value; (13) base correction; (14) correction for diurnal variation and for magnetic storms; (15) correction for normal and regional variation; (16) correction for the indexes and auxiliary magnets; (17) field procedure; (18) accuracy; (19) costs; (20) the application of the magnetic method in the Witwatersrand; (21) the tracing of magnetic shale beds; (22) the question of the strike; (23) the problem of the suboutcrop; (24) the problem of the dips; (25) the locating of dykes; (26) the determination of depths; (27) the problem of positive and negative anomalies; and (28) the possible application of the seismic and gravimetric methods.

This paper was presented by the author at the joint meeting of the Chemical, Metallurgical and Mining Society of South Africa and the Geological Society of South Africa held on April 25, 1934 in the Assembly Hall, Kelvin House, Johannesburg.

After the discussion of the paper it was resolved to thank Weiss for his very valuable and instructive paper.--W. Ayvazoglou.

## (2026) GEOPHYSICAL OPERATIONS ON THE RAND

Editorial Note

South-African Mining and Engineering Journal, Johannesburg, vol. 45,
no. 2175, 1934, p. 173

The author of this note mentions a paper presented by Oscar Weiss at the joint meeting of the Chemical, Metallurgical and Mining Society and the Geological Society of South Africa, held on April 25, 1934 at Kelvin House, Johannesburg. (See abstract no. 2025).

The ultimate aim of geophysical prospecting methods and their present possibilities as an aid in furnishing additional information to the geologist and mining engineer, the use of geophysical methods in gold mining, the limitations of magnetic methods, the seismic and gravimetric methods, and a combination of various methods are discussed.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (2027) ON P'P' AND RELATED WAVES

By B. Gutenberg and C. F. Richter

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 2, 1934, pp. 149-159.

The new vertical seismographs designed by Benioff can be set up to give records with high magnification for periods of about 1 second, with considerably less magnification for periods over 4 seconds. Instruments of the type ($T_0$ = 0.5; T = 0.2 or 1.5) are in service at all seven stations of the southern California network.

Such seismograms give excellent detail in the preliminary phase of teleseisms, while the surface waves are either not recorded at all or with such small trace amplitudes that they do not interfere with the record of the preliminaries. The seismograms of deep-focus earthquakes are especially satisfactory.

When a strong teleseism is followed by aftershocks, records of this type make it easy to pick out the beginning of each separate shock. Numerous cases of the kind are to be found in our files; but it has recently appeared that some supposed instances are spurious, being due to an entirely different phenomenon. This forms the principal subject of the present paper.--Author's abstract.

### (2028) CONTRIBUTION TO THE STUDY OF DEEP-FOCUS EARTHQUAKES

By B. Gutenberg and C. F. Richter

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 2, 1934, pp. 160-169.

In this article the authors present certain rapid and convenient methods for interpreting the records of deep-focus earthquakes. According to the authors these methods are in regular use in Pasadena and furnish the basis for the discussion of new phases in the preceding paper. The procedure is by no means final; it is offered by the authors in justification of the preceding results and as a contribution to the rapidly developing theory of these interesting shocks.

The following items constitute the article: (1) Determination of origin time; (2) determination of depth (from pP and sP); (3) determination of distance; (4) determination of distance and depth by means of P'P' etc., and (5) concluding remarks.--W. Ayvazoglou.

## (2029) ON THE IMPORTANCE OF APPLIED SEISMOMETRY FOR DETERMINING GEOLOGICAL STRUCTURE. (IN RUSSIAN)

By W. S. Nikonoff

Problems of Soviet Geology, Moscow, vol. 1, no. 2, 1934, pp. 147-153.

Nikonoff describes the results of seismic surveys carried out in 1932 in the region of the Kursk anomaly. Schweidar's method developed by Gamburtzeff was applied. An isohypsometrical map of the underground, based on the data obtained by measurements, is given.--W. Ayvazoglou.

## (2030) PROPAGATION OF ELASTIC WAVES IN ICE. PART I.

By Maurice Ewing, A. P. Crary, and A. M. Thorne, Jr.

Physics, Lancaster, vol. 5, no. 6, 1934, pp. 165-168.

Measurements of the velocity of sound vibration in ice have been made in some detail both by direct and resonance methods. The velocity of longitudinal waves was measured directly on large bodies of ice. Blasting caps were used to create elastic disturbances, and the time of travel was recorded by an electric seismograph placed at suitable distances. A plot of time against distance gives a remarkably straight line showing a velocity of 3,410 meters per second. Laboratory measurements were made on long, thin rods of ice which were excited by an oscillator and resonance frequencies measured both for longitudinal and torsional vibrations. The velocities for these vibrations are found to be 3,163 and 1,913 meters per second, respectively. A formula is derived by which the velocity of longitudinal waves in a thin, infinite plate can be found from these velocities. This formula gives a value of 3,400 meters per second which checks with that obtained directly by less than 1 percent. Various other elastic constants for ice are also deduced from these measurements. The values of Young's modulus and Poisson's ratio for ice are found to be 9.17 x $10^{10}$ dynes/$cm^2$ and 0.365, respectively, in the range -5° C. to -15° C.--Author's abstract.

## (2031) ERGEBNISSE DER HÖRBEOBACHTUNGEN DES SPRENGVERSUCHS IN OLDEBROEK AM 15 DEZEMBER 1932

## (RESULTS OF ACOUSTICAL OBSERVATIONS OF THE BLASTING TEST MADE IN OLDEBROEK ON DECEMBER 15, 1932)

By P. Duckert

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 119-126.

Four blasts of 300 kilograms each were made on December 15, 1932 in Oldebroek. A great number of stations were established for acoustical observations of the propagation of the sound. A picture showing the process of propagation, drawn from the collection of the data obtained by acoustical observations, accompanied by a description and explanation are given.--W. Ayvazoglou.

### (2032) DIE WETTERLAGE UND DIE SCHICHTUNG DER ATMOSPHÄRE AM 15 DEZEMBER 1932, DEM SPRENGTAG VON OLDEBROEK

### (WEATHER CONDITIONS AND STRATIFICATION OF THE ATMOSPHERE ON DECEMBER 15, 1932, THE DAY OF THE BLAST IN OLDEBROEK)

By Paul Duckert

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 127-144

A description of the atmospheric conditions on December 15, 1932 is given and illustrated by three figures. The complete compilation is given of all the aerological measurements made during this day in the region of the propagation of the sound caused by the Oldebroek blast. The distribution of the velocities of the sound up to an altitude of about 20 kilometers is derived from these data and those obtained from the high-altitude-recording balloons.

The results of these calculations may serve for further investigations.--Author's abstract translated by W. Ayvazoglou.

### (2033) MATERIALZUSAMMENSTELLUNG DER SCHALLREGISTRIERUNGEN WÄHREND DER SPRENGUNGEN IN OLDEBROEK (HOLLAND) AM 15 DEZEMBER 1932

### (COLLECTION OF THE MATERIAL OF THE SOUND RECORDS OBTAINED DURING THE BLASTS PERFORMED IN OLDEBROEK, HOLLAND, ON DECEMBER 15, 1932)

Editorial Note

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 145-158.

In this article the material is given concerning the blasts performed in Oldebroek on December 15, 1932.

Collection of the material was instigated by the "blast commission" and was carried out by the Reichsanstalt für Erdbebenforschung, Jena (O. Meisser and H. Martin) and the Geophysical Institute of Göttingen (C. Angenheister, H. Jung, and H. Regula).--W. Ayvazoglou.

### (2034) BEITRÄGE ZU DEN LUFTSCHALLMESSUNGEN

### (CONTRIBUTIONS TO THE MEASUREMENTS OF THE SOUND IN THE AIR)

By O. Meisser and H. Martin

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 158-166.

The measurements are examined under the following headings:

A. Time service for measurements of the sound in the air: (a) Transmitting device; (b) time-signal transmitter; (c) time-signal recorder.

B. Accuracy of recording of Kühl's undograph and Wiechert's membrane-apparatus: The two instruments are compared. The records obtained by the instruments are shown in a figure.

C. Rough evaluation: Wiechert's method is discussed.

D. Proposition for further investigations on the sound waves in the air by registering observations: Locations suitable for these investigations are mentioned.--W. Ayvazoglou.

## (2035) SCHALLAUSBREITUNG IN DER ATMOSPHÄRE

## (PROPAGATION OF SOUND IN THE ATMOSPHERE)

By Herbert Regula

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 167-185.

The first part of this article deals with the results of evaluation of 775 sound records made by the Geophysical Institute of Göttingen during the years 1923 to 1929, especially with regard to the dependence of the propagation of sound from azimuth and season and to the possibility of measuring the altitude winds by soundblasts. In the second part the author discusses from the standpoing of physics the various theories on the phenomenon of anomalous sound. The third part deals with the first evaluation of the records of the Oldebroek blast performed on December 15, 1932. The course of the travel-time curve of the anomalous sound in the east profile (convex with regard to the △-axis) and the beginning of this travel-time curve are established definitely. The end remains uncertain. According to a more accurate investigation a lateral turning of the wave front at about 5° can be supposed. It could not be established whether this is caused by the reflection from the border of a layer at high altitude or whether there is a constant bending in the course of the rays.--Author's abstract translated by W. Ayvazoglou.

## (2036) BERECHNUNG DER LAUFZEITKURVEN DES ANORMALEN SCHALLES FÜR WINDSTILLE ATMOSPHÄRE UND VERGLEICH MIT DER LAUFZEITKURVE DER OLDEBROEK-SPRENGUNG VOM 15 DEZEMBER 1932

## (CALCULATION OF TRAVEL-TIME CURVES OF THE ANOMALOUS SOUND FOR CALM ATMOSPHERE AND COMPARISON WITH THE TRAVEL-TIME CURVE OF THE OLDEBROEK BLAST OF DECEMBER 15, 1932)

By Heinrich Jung

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 186-196.

Theoretical travel-time curves for the anomalous sound are calculated and compared with the experimental results obtained from the Oldebrock blast of December 15, 1932 under the assumption of various distributions of the velocity of sound and of the temperature. It is shown that the assumption of a calm atmosphere is not sufficient for the explanation of the observations and that it is not possible to determine, based on the material available, whether a reflection from the border of a layer or a constant bending of the sound rays in the stratosphere takes place.--Author's abstract translated by W. Ayvazoglou.

## (2037) ERGEBNISSE DER REGISTRIERUNGEN VON SCHALLWELLEN AN KREISFÖRMIG UM DEN SPRENGHERD ANGEORDNETEN STATIONEN

## (RESULTS OF RECORDS OF SOUND WAVES AT STATIONS DISTRIBUTED CIRCULARLY AROUND THE POINT OF EXPLOSION)

By P. Duckert

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 197-200.

The author shows the general difficulties that arise in obtaining material for mathematical calculations of the course of the sound. Notwithstanding this, even assumptions of a simplified structure of the atmosphere give results which agree well enough with the observed travel time of the sound. The results from a series of stations distributed circularly around the point of explosion are calculated under the assumption of a mean wind of W. 6° N. direction and 32 meters per second velocity, blowing from the ground up to the maximum height of the course of the sound.--Author's abstract, translated by W. Ayvazoglou.

## (2038) BEOBACHTUNGSERGEBNISSE ÜBER DEN EINFLUSS DER "AKUSTISCHEN UMKEHRSCHICHT" AUF DIE SCHALLAUSBREITUNG

## (RESULTS OF OBSERVATIONS ON THE INFLUENCE OF THE "ACOUSTICAL LAYER OF REVERSAL" UPON THE PROPAGATION OF THE SOUND)

By B. Sandmann

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 200-215

The investigations discussed in this article concern the material of observations obtained from the blasts arranged by the "Notgemeinschaft der Deutschen Wissenschaft." It is proved that in cases in which the anomalous sound was established in Potsdam at a distance of about 37 kilometers, as far as they can be considered based on sufficient data of meteorological measurements, this sound must be attributed to the "acoustical layer of reversal" (akustische Umkehrschicht). (According to the author's definition the "acoustical layer of reversal" is a layer in which the velocity of sound, after a previous decrease with the altitude, remains constant or even increases.) The results of observations in question were not discussed as yet. --Author's abstract, translated by W. Ayvazoglou.

## (2039) ZUR FRAGE DER ANOMALEN SCHALLAUSBREITUNG

## (CONTRIBUTION TO THE QUESTION OF THE ANOMALOUS PROPAGATION OF SOUND)

By Joseph Kölzer

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 215-221.

The last tests for explaining the cause of the anomalous propagation of sound are examined. The author indicates that the assumption of a high temperature in the upper atmosphere cannot be considered a solution of the question owing to lack of data and contradictory records. The necessity of combining the records for middle distances with complete meteorological data is considered the most important requirement, and the author expresses the supposition that, according to the results available at present, the anomalous propagation of sound at close and middle distances may, in certain cases, be explained by bending.--Author's abstract, translated by W. Ayvazoglou.

## (2040) SCHALLUNTERSUCHUNGEN IM POLARGEBIET

## (SOUND INVESTIGATIONS IN THE POLAR REGION)

By K. Wölcken

Zeitschrift fur Geophysik, Braunschweig, vol. 10, no. 3/4, 1934, pp. 222-234.

The author reports on sound measurements carried out in the polar region during the polar year 1932-33. The report contains a preliminary elaboration of records from three stations; the records of the fourth station are not evaluated as yet.--Author's abstract, translated by W. Ayvazoglou.

## 4. ELECTRICAL METHODS

## (2041) EINIGES ÜBER DIE GRUNDLAGEN DER FUNKMUTUNG

## (CONTRIBUTION TO THE FUNDAMENTAL PRINCIPLES OF ELECTRICAL METHODS OF PROSPECTING)

By Volker Fritsch

Montanistische Rundschau, Berlin, vol. 26, no. 4, 1934, pp. 1-6.

In the first part of the article the author discusses: (1) Physical definition of the problem; (2) electrical properties of conductors (dielectric constant, conductibility, magnetic permeability); (3) homogeneous and heterogeneous conductors.

The second part deals with the general knowledge of various electrical methods: (1) Absorption method; (2) reflection method; (3) capacity method;

(4) diagram method; (5) dielectric constant method and conductibility method; and (6) radiation method (Einstrahlungs methode).

The examination of the methods is illustrated by figures. A list of reference books is added.--W. Ayvazoglou.

### (2042) DISCOVERING GOLD-QUARTZ VEINS ELECTRICALLY

By Sherwin F. Kelly, Theodor Zuschlag, and Bela Low

Mining and Metallurgy, New York, vol. 15, no. 330, 1934, pp. 251-256.

The area studied lies about halfway between the towns of Thomson and Washington (Georgia), on the main highway connecting the two and some 40 miles west of Augusta. It is in the McDuffie County gold belt. The rocks in this part of the McDuffie belt investigated are mainly pre-Cambrian schists and gneisses.

A brief description of the ground comparator used in this survey is given. Its advantages, disadvantages, and operation are described.

Over 13,000 feet of electrical profiles were observed, and a few typical examples are cited to illustrate what such a survey can be expected to accomplish.

A figure showing the mineral survey on the Hamilton mine and Forty Acre lot, McDuffie County, Ga., is given with a series of profiles.

The authors conclude that electrical geophysical studies evidently constitute an important step in the successive stages of narrowing the search for ores and minerals. Areal geological investigations can indicate regions favorable for further search; closer geological study indicates where the formations favorable to ore occurrence will be found; geophysical surveys on these formations pick out those places where these ore bodies produce the physical effect of the sought-for ore; the pick and shovel or the drill then determine which of these are commercial ore.

According to the authors, perfection of instruments, such as the ground comparator, extends the field of usefulness of the electrical methods, permitting them to attack problems heretofore considered insoluble electrically, such as the location of quartz veins in gold-bearing districts.--W. Ayvazoglou.

## (2043) INFLUENCE DE L'EAU D'IMBIBITION DES ROCHES SUR LEUR CONDUCTIBILITÉ ÉLECTRIQUE

## (INFLUENCE OF THE IMBIBITION WATER OF ROCKS UPON THEIR ELECTRICAL CONDUCTIVITY)

By Mrs. F. Bayard-Duclaux

Comptes Rendus de l'Académie des Sciences, Paris, vol. 197, no. 16, 1933, pp. 854-6.

A general study of very different rocks was carried out. The samples were kept in a glass case for several months and then weighed and measured. After drying them in an electrical furnace for 3 days at 190° they were again weighed and measured. The loss of water was determined. The conductivities observed were from $5 \times 10^{-11}$ mho (obsidian) to $2.5 \times 10^{-6}$ (shist) for the undried rocks and less than $8 \times 10^{-12}$ mho for the dried rocks; that is, the latter became all nonconducting. The conductivity-time curves were determined for dried rocks after the latter were exposed to the atmosphere of the room.--W. Ayvazoglou.

## (2044) ON THE THEORETICAL DETERMINATION OF EARTH RESISTANCE FROM SURFACE POTENTIAL MEASUREMENTS

By A. F. Stevenson

Physics, Lancaster, vol. 5, no. 4, 1934, pp. 114-124.

A general solution for the potential in the steady flow of current from a single-point electrode when the conductivity is an arbitrary continuous function of position is given in the form of an infinite series by using the method of successive approximations, and conditions for the validity of the solution are discussed. The converse problem of determining the conductivity when the surface potential is known is then shown to lead to an integral equation which has no unique solution. The problem can be made determinable, however, by restricting the functional form of the conductivity--in particular by supposing that it is a function of depth only--or by supposing that the electrode is movable and that the surface potential is known for all positions of the electrode on some curve at the surface. It is shown how the integral equations can be solved formally by the method of successful approximations. For the special case where the conductivity is a function of depth only, the first approximation is worked out in detail, and an approximate method is given for solving the resulting integral equation for the conductivity.

This method is critically discussed and compared with the more exact method of Slichter and Langer. A numerical example is worked out where the conductivity is known in advance, namely a special case of the three-layer earth. It is shown that the present method gives a rough indication of the true behavior of the conductivity, but that the Slichter-Langer method and the "apparent-resistivity" method both fail completely for this case. It is suggested that in certain cases the present method might give a better result than that of Slichter and Langer.--Author's abstract.

### (2045) REGISTRATION OF EARTH CURRENTS WITH NEUTRAL ELECTRODES

By S. K. Banerji

India Meterological Department, Mem., vol. 26, no. 1, 1933, 11 pp.

The paper describes certain experiments made at the Colaba and Alibag Observatories during 1928-30 in regard to the registration of earth currents with short lines about 250 meters long. The polarization difficulties were overcome by making the electrodes neutral with respect to the soil, each electrode being a combination of electropositive and electronegative metals, the actual composition being found by trial and varying with the soil. The neutrality is not maintained indefinitely, and to avoid frequent removal and scraping of the electrodes, small separate electrodes of the positive and negative metals are sunk, and one or the other of these is joined to the main when necessary to correct for any small polarization current that may develop. Such installations were set up at Colaba and Alibag, which are 5 and 25 miles respectively from the center of the Bombay electric tramway network. Photographic records of earth currents show the leakage from this network; the oscillations are in excellent agreement with the voltage record at the power station. The range of the oscillations of the leakage current is about 110 microamperes at Colaba and only 5 at Alibag; the reduction in range agrees roughly with that corresponding to laminar flow. The disturbance produced in the magnetic registers agrees with the oscillatory magnetic force which such plane current sheets will produce. Besides the leakage currents, the earth current records show the natural diurnal current variation and disturbance currents during magnetic storms.--Author's abstract.

## 5. RADIOACTIVE METHODS

### (2046) NOUVELLES RECHERCHES SUR LA RADIOACTIVITÉ DES EAUX DU MASSIF DU BALLON D'ALSACE

### (NEW INVESTIGATIONS ON THE RADIOACTIVITY OF WATERS OF THE ALSATIAN MOUNTAIN TOP MASSIF)

By R. Delaby, R. Charonnat, and M. Janot

Comptes Rendus de l'Académie des Sciences, Paris, vol. 197, no. 20,
Nov. 13, 1933, pp. 1140-1142.

A great number of radioactive sources were discovered by the authors in 1931 and 1932 on the tops of the principal mountains of the Alsatian chain. Figures on the radioactive emanation are given.--W. Ayvazoglou.

## (2047) RADIOGEOLOGICAL SURVEY OF CZECHOSLOVAKIA

By W. Santholzer and F. Ulrich

Nature, London, vol. 133, no. 3360, 1934, p. 461.

The authors investigated radiogeologically the district of Krkonose (Riesen Gebirge) and in the Jizera Mountains, where strong radioactive springs (containing up to 200 Mache units) occur frequently along faults, contacts, etc. The radioactivity of springs in the whole area of the Krkonose was measured systematically. At the same time, analyses of rocks in the neighborhood of the springs have been made with regard to their contents in radium elements. Correlation between geological structure and the analyses of waters and rocks were studied. It was proved that waters became radioactive in contact with phyllite (radium content, 8.3 x $10^{-12}$ per gram) and orthogneisses (radium content, 4 - 7 x $10^{-12}$ per gram).

A report of the first part of these investigations in the area of the Krkonose will be published soon.--W. Ayvazoglou.

## 6. GEOTHERMAL METHODS

## (2048) COOLING OF A RADIOACTIVE SPHERE

By A. N. Lowan

Physical Review, Lancaster, vol. 44, no. 9, 1933, pp. 769-775.

By means of the Laplace transformation any physical problem characterized by a partial differential equation, the solution of which must satisfy prescribed initial and boundary conditions, can be transformed formally into a boundary problem for an ordinary differential equation. From the solution of the latter problem, that of the original problem may be obtained by the inversion of the Laplace transformation. The method is applied to the problem of the cooling of a radioactive sphere, and the solution of this problem is applied to a discussion of the thermal history of the earth.--Author's abstract.

## (2049) THERMAL CONDUCTIVITIES OF ROCKS

By H. A. Nancarrow

Physical Society, Proceedings, vol. 45, May 1, 1933, pp. 447-461.

The rock specimens are turned as circular cylinders 5 cm in diameter and 2 cm high and are bisected by a cut made perpendicular to the base along one diameter. The top of the cylinder is heated and the temperature gradient in the specimen is measured by means of thermocouples held in a mica holder inserted in the cut. The temperature distribution and heat flow in the specimen are each shown to be represented by a series containing Bessel and hyperbolic functions.

Constants involved in the arguments of these functions are shown to be dependen upon the loss of heat from the hot surfaces exposed to the air in the apparatus The determination of these surface heat losses is described. Observations and results are given for four specimens.--Author's abstract.

## 7. UNCLASSIFIED METHODS

### (2050) ERFORSCHUNG DES UNDERGRUNDES MIT GEOPHYSIKALISCHEN METHODEN

(INVESTIGATION OF THE SUBSOIL BY GEOPHYSICAL METHODS)

By H. Reich

International Zeitschrift fur Bohrtechnik, Erdölbergbau und Géologie,
Vienna, vol. 41, no. 11, 1933, p. 123.

This is a résumé given on the lecture delivered by Prof. Reich at the meeting of the Berliner Bezirksverein fur deutsche Ingenieure (Berlin District Association of German Engineers) held on February 1, 1933.

The fundamental principles of geophysical methods of prospecting (gravitational, magnetic, seismic, radicactive, electrical), their application in the search for minerals and oil, and some results obtained in various countries are discussed.--W. Ayvazoglou.

### (2051) GENERAL VERSAMMLUNG DER DEUTSCHEN GESELLSCHAFT FÜR MINERALÖLFORSCHUNG

(GENERAL ASSEMBLY OF GERMAN PETROLEUM-RESEARCH SOCIETY)

Editorial

Petroleum Zeitschrift, Berlin, vol. 30, no. 19, 1934, pp. 1-20.

The General Assembly of the Society was held on April 26, 1934 in Berlin.

The following two lectures on geophysics were delivered.

1. Die neueste Entwickelung des geophysikalischen Apparatebaues (The Recent Developments in Constructing Geophysical Apparatus), by Dr. A. Graf.

2. Vergleiche über Pendelmessungen, magnetische und Drehwaagenmessungen (Comparisons Concerning Pendulum Measurements, Magnetic, and Torsion-Balance Measurements) by Scheusener.--W. Ayvazoglou.

## (2052) DZHAKSY-BAI OIL FIELD, EMBA REGION (IN RUSSIAN)

By N. A. Hramov

Transactions of the Geological Oil Research Institute,
serues B, no. 53, 1934, pp. 1-16.

The orography, stratigraphy, and tectonics of the region are described.

Under the heading "Geophysical observations in the region" the author exmines the geophysical exploration work carried out in this region by the ravimetrical and seismic methods.

The minimum gravity gradient was established to have a form of an elonated oval extending from southeast to northwest, and located to the southeast f the Kara-Tyube Mountains.

Seismic work was done after the completion of geological investigations; ts purpose was to determine the deep structure of the region. A map showing he relief of the salt dome was drawn from 8 profiles, each 3 km long. The rofiles radiated from the point of explosions situated in the center of the eological elevation. The depth of the salt shown in the map was proved by ne boring with an error of 10 percent.--W. Ayvazoglou.

## (2053) GEOPHYSICAL WORK ON GULF COAST INCREASES

Editorial Note

Oil Weekly, Houston, vol. 74, no. 1, 1934, pp. 57-58.

According to this note geophysical work in the Louisiana-Texas Gulf coast as shown a marked increase since the first of the year. Considerable work s being done on large blocks taken on geophysical option, as well as detail ork on the edges of old domes or on known but unproductive structures, in etailing for well locations.

Of the 121 instruments and crews on the Texas and Louisiana Gulf coast, he Texas Gulf coast shows a total of 63 instruments including 32 torsion alances, 25 reflection crews, 2 pendulums, 2 magnetometers, and 2 gravity eters.

In the Louisiana coastal area there are 45 torsion-balance instruments at ork, 10 reflection crews, 2 pendulums, and 2 magnetometers, making a total f 58 geophysical instruments and crews.--W. Ayvazoglou.

## (2054) A MINERAL SURVEY OF BRAZIL

Editorial Note

The Mining Magazine, London, vol. 50, no. 5, 1934, pp. 315-316.

This note mentions the recent reorganization of the Brazilian Ministerio de Agricultura which resulted in an intensification of the work of those technical bureaus charged with the study of the natural resources of the country. A short report published by M. C. Malamphy, consulting geophysicist to the Directoria de Minas, deals with the reforms in the Geological service department. Application of geophysical methods of prospecting, especially for oil, is planned. The search for petroleum will be divided into three phases: (1) Reconnaissance geological and geophysical surveys; (2) detailed geological and geophysical surveys; and (3) drilling on those structures considered as favorable after detailed geological and geophysical surveys have been completed. The equipment of the Directoria de Minas with instruments for gravitational, magnetic, seismic, and electrical methods of prospecting is mentioned. A magnetic survey has already been completed in the State of Santa Catherina, and magnetic and gravitational surveys are now in progress in the State of Sao Paulo. Results to date indicate that the geophysical data will be of considerable value in elucidating the general and structural geology of these regions.--W. Ayvazoglou.

## 9. NEW BOOKS

(2055) Freeman, Henry. Deutsch-englisches Fachwörterbuch der Metallurgie (Eisen und Metallhüttenkunde). German-English Technical dictionary of metallurgy (metallurgy of iron and metals). Vol. 1, German-English, Leipzig, Otto Spamer, 1933, 327 pp. Price, R.M. 25.

(2056) Kober, L. Die Orogentheorie. Grundlinien eines natürlichen Gestaltungsbildes der Erde. (The theory of orogeny. Fundamental principles of the natural configuration of the earth.) Berlin, Verlag von Gebrüder Borntrager, 1933, 184 pp., 50 figs. Price, R.M. 16.00.

(2057) Kober, L. Der Bau der Erde. (Structure of the Earth.) Berlin, Verlag von Gebrüder Borntrager, 2d ed., revised and enlarged, 1928, 500 pp., 100 figs. and 2 tables. Price, R.M. 30.00.

(2058) Soergel, Dr. W. Fortschritte der Geologie und Palaeontologie. (Progresses in geology and paleontology.) Vol. 11, no. 34, Geophysik und Lagerstätten. (Geophysics and deposits.) Berlin, Verlag von Gebrüder Borntrager, 1932, 87 pp., 18 figs. Price, R.M. 9.00.

(2059) World Petroleum Congress, Proceedings, London, 1933. Vol. 1, 1934, Geological and Production Series, edited by A. E. Dunstan and George Sell, 592 pp., Illus. Address, Joint editors, World Petroleum Congress, Aldine House, Bedford Street, London, W.C. 2. Price, to members of the

Congress £1, 10s; to nonmembers, £1, 15s; nonmember price, through W. S. Malloy, 9-10 Bridge Street, New York, $8.85 plus 24 percent duty.

From a review given by W. P. Haynes in the bulletin of the American ssociation of Petroleum Geologists, vol. 18, no. 6, 1934, pp. 822-824, e read:

The Proceedings of the World Petroleum Congress, held in London, July 9-25, 1933, have just been published in two volumes. Volume 1 includes the apers given at the Congress in the geological and production sections, and olume 2 includes papers in the refining, chemical, and testing section. ach paper has a summary in English. The papers are grouped under the followng main headings:

Geological Section: (1) Geological significance in the regional disribution of oil fields; (2) modern developments in geological exploration part 1, geophysics, part 2, other methods); (3) geological aspects of oilield development.

Production Section: (1) Drilling; (2) production; (3) transport and torage of oil.

General: (1) Speech by Sir John Cadman, "Science in the Petroleum ndustry"; (2) speech by J. B. Aug. Vessler, "Rationalization in the Oil ndustry."

The geophysical papers are arranged under the following heads: Magnetic ethod, electrical methods, radioactive and thermal methods, gravitational ethod; seismic method, and methods in combination.

Under magnetic methods Van Weelden has a paper on "Magnetic Anomalies in il fields", and Reich and von Zwerger have papers on magnetic work in Germany.

Electric methods include "Structural Investigations by Electromagnetic ethods", by Sundberg and Hedstrom; a paper in German by Belluigi of Italy on rogress in electrical research for petroleum; and one by Weiss on limitations f geophysical methods and new possibilities by an electrochemical method for etermining geological formations at great depths. These are followed by two apers in German on radioactive methods by Ebert and Ostermeier and one on he significance of underground temperatures by M. W. Strong.

The gravitational method includes a paper on the torsion balance in oil rospecting by Templeton, general torsion-balance papers by Vajk and Rainbow, nd papers in German on North German salt domes by Breyer and Kaselitz.

The seismic method is covered by Goldstone in his paper on mapping by eflection waves and by Jones in his "Seismic Method of Mapping Anticlinal tructures." Ambronn has a paper in German describing the special type of eismograph which he has perfected.

The geophysical section is concluded with four papers of a general nature in which several methods are involved. These include van Weelden's paper covering geophysical work in the Wichita-Arbuckle region, Fossa-Manchini's on geophysics in the Argentine, and Belluigi's on the geophysical work carried out by the A.G.I.P. in Italy; also a general paper in German on geophysical research, by Barsch.

## 10. PATENTS

### (2060) METHOD FOR LOCATING WATER-BEARING STRATA IN BOREHOLES

Frederick W. Huber, of Riverside, Calif.

U. S. Patent 1536007 Issued Apr. 28, 1925.

This invention relates to a method of determining the location of water-bearing strata in boreholes which consists in supplying to the borehole water presenting less saline concentration than the solution in the water-bearing strata so that diffusion from the water-bearing strata will establish a zone of relatively high saline concentration in the column of liquid in the borehole opposite a water-bearing stratum, then measuring the electrical conductivity of the liquid in situ at different parts of said column to determine the location of any part thereof presenting such relatively high saline concentration, while preventing fouling of the electrical measuring means by oil and while employing alternating current in said measuring operation.

Claims allowed - 10.

### (2061) METHOD OF LOCATING THE LEVEL AT WHICH WATER ENTERS A WELL

Raymong D. Elliott, of Whittier, Calif., assignor of one half
to Edmund J. Young, of Berkeley, Calif.

U. S. Patent 1537919 Issued May 12, 1925.

This invention relates to a method and apparatus for locating the level at which water enters a well; the combination of steps consists of displacing the contents of the well by filling the well from the bottom up with a liquid of known electrical resistance, then withdrawing enough of the liquid from the well to permit the entrance of water from the water-bearing stratum, and then testing the electrical conductivity of the liquid column in the well at successive levels until a level is ascertained at which the electrical conductivity of the liquid column is different from that of the displacing liquid.

Claims allowed - 10.

### (2062) METHOD OF LOCATING WATER-BEARING STRATA IN BOREHOLES

Frederick W. Huber, of Riverside, Calif.

U. S. Patent 1555800 Issued Sept. 29, 1925.

This invention relates to a method of determining the location of water-bearing strata in boreholes which consists in establishing in the borehole a column of water of relatively low saline concentration and permitting the formation therein of zones of relatively high concentration opposite each water-bearing stratum, measuring the saline concentration of different heights in the said column to determine the location of such zones of relatively high saline concentration, withdrawing water from such column to lower the upper level thereof, and repeating the measurement of saline concentration at different levels in said column to give a more exact and sharper indication of the location of zones of relatively high saline concentration.

Claims allowed - 8.

### (2063) METHOD OF LOCATING WATER-BEARING STRATA IN BOREHOLES

Frederick W. Huber, of Riverside, Calif.

U. S. Patent 1555801 Issued Sept. 29, 1925.

This invention relates to a method of locating fluid-bearing strata in boreholes which consists in determining the normal fluid level in the borehole, removing fluid from the borehole sufficiently to cause the fluid-bearing strata to discharge any intruded fluid into the borehole, displacing such connate fluid from the borehole by fresh water and continuing to supply fresh water to the borehole to bring the fluid level above normal fluid level, then making several successive series of electrical conductivity measurements in the fluid at different depths in the borehole, and lowering the fluid level by stages between each successive series of measurements so as to determine the depth at which connate fluid of different conductivity than the fresh water in the borehole enters such fresh water.

Claims allowed - 8.

### (2064) APPARATUS FOR LOCATING WATER-BEARING STRATA IN BOREHOLES OF FLOWING WELLS

Frederick W. Huber, of Riverside, Calif.

U. S. Patent 1555802 Issued Sept. 29, 1925.

This invention relates to a method for locating water-bearing strata in boreholes in oil- or gas-bearing formations, and the main object of the invention is to provide a means and method whereby the location of such water-bearing strata may be positively determined without interrupting the operation of the well. The claim of the inventor is as follows: In combination with an oil well a pipe independent of the oil-well casing is extended into said well and provided with means for passing water therethrough into the well, means for raising and lowering said pipe, an insulated conductor extending through said pipe, electrodes adapted to be exposed to the liquid in the well, an electrical circuit connected to said conductor, and means for measuring the resistance of the liquid between said electrodes.

Claims allowed - 4.

### (2065) ELECTRODE MEANS FOR CONDUCTIVITY TESTS OF LIQUIDS IN OIL WELLS OR OTHER BODIES OF LIQUID

Frederick W. Huber, of Riverside, Calif.

U. S. Patent 1555803 Issued Sept. 29, 1925.

This invention relates to means for conductivity measurements in aqueous liquids containing oily material comprising a support, electrodes carried thereby, and electrical connections to said electrodes, said electrodes being of conductive material coated with oil repellent material.

Claims allowed - 8.

### (2066) METHOD OF ELECTRICAL PROSPECTING

Norman H. Ricker, Houston, Tex.

U. S. Patent 1960027 Issued May 22, 1934.

This invention relates to electrical methods of prospecting for oil, gas, water, ore bodies, and any other buried masses whose electromagnetic constants are different from those of the surrounding earth. The method comprises setting up an alternating electromagnetic field which would possess symmetry about a vertical axis were the earth electromagnetically homogeneous, making observations at a series of correlated points of the position in space of the plane of the vibration ellipse of the magnetic component of said electromagnetic field, and coordinating the data so obtained.

Claims allowed - 14.

### (2067) MEANS OF ELECTRICAL PROSPECTING

Norman H. Ricker, Houston, Tex.

U. S. Patent 1960028 Issued may 22, 1934.

This invention relates to an apparatus for determining the existence and location of concealed objects whose electromagnetic constants differ from those of the surrounding space, including a linear conductor disposed in the form of a closed plane figure, said figure having a definite number of lines of symmetry, a source of alternating current for energizing said conductor, and means to determine the departure from symmetry of the resulting electromagnetic field.

Claims allowed - 4.

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G.A. No. 65

DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director
- - - - -
GEOPHYSICAL ABSTRACTS
MINING DIVISION

September, 1934.

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# ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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# 1. GRAVITATIONAL METHODS

## (2068) A NEW TORSION BALANCE FOR FAST WORK

Editorial note

Engineering and Mining Journal, New York, vol. 135,
no. 6, 1934, p. 284

This new balance is made by the American Askania Corporation. The instrument is of the photographic type and rests on a light tripod. Its beam presents the most radical departure from earlier designs. The new instrument has a straight and inclined beam (two for each instrument reversed through 180°), with a special suspension system. The construction of this beam, the chamber in which it swings, and the heavier tungsten wire have reduced the period of observation to 20 minutes. The sensitivity has suffered a slight loss, but the comparative field tests of the inclined beam-balance and the Askania Z-bar instrument have furnished excellent results and have proved the value of the new instrument. The cost per station, which used to be about $12 to $15, can now be cut to $7.50.--W. Ayvazoglou.

## (2069) ON THE MOVEMENT OF PENDULUM UNDER INFLUENCE OF THE MOTION OF A SHOCK TYPE

By Takeo Suzuki

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 12, no. 2, 1934, pp. 155-162

Mathematical discussion on the movement of the pendulum under the influence of the motion of a shock type is given. Numerical calculations are carried out for several cases, and the results are graphically shown in diagrams.--W. Ayvazoglou.

## (2070) NOTES ON CORRELATION BETWEEN VERTICAL EARTH MOVEMENTS AND GRAVITATIONAL ANOMALIES

By Naomi Miyabe

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 12, no. 2, 1934, pp. 163-173

Author discusses the possibility of obtaining some information regarding the origin of the chronic vertical earth movements by investigating the correlations between the vertical earth movements and the gravitational anomalies. From the discussions he draws the conclusions that the deformation of the earth's crust is in progress mainly to restore isostatic equilibrium, but that in some districts orogenic and epirogenic movements other than isostatic seem to be predominant.-- W. Ayvazoglou.

## (2071) GRAVITY WORK IN EAST AFRICA

Editorial note

Nature, London, vol. 133, no. 3374, 1934, p. 989

The short account by Dr. and Mrs. Bullard on the work done during the recent Cambridge Gravity Expedition to East Africa, published in the annual report, 1934, of the Committee for Geodesy and Geophysics at Cambridge, is mentioned in this note. Bullard made gravity observations at 57 stations in Africa from November to April of this year. The tour extended from Nairobi through the west and northwest part of Kenya, Uganda, the southern Sudan, part of the Belgian Congo to the west of the Rift Valley, and back to Nairobi. Bullard then proceeded to Mombasa through Tanganyika and from Mombasa by coast to Cape Town, making shore observations at Dar-es-Salaam and Cape Town. Dr. Bullard also made magnetic observations on his tour.--W. Ayvazoglou.

## (2072) GRAVITY AND HYPOTHESIS OF CONVECTION CURRENTS

By F. A. Vening-Meinesz

Proceedings K. Akademie, Amsterdam, vol. 37, no. 2, 1934,
pp. 37-45

The abstract of this paper, signed by C.A.S., is reprinted from Science Abstracts, sec. A, vol. 37, no. 437, 1934; it reads as follows:

> Recent results show positive gravity anomalies over parts of the oceans, and in particular in all the deep basins in the tectonically active areas, e.g., the Dutch East Indies. Such depressions are not explicable by synclinal folding and must be attributed to subsidence, whilst the anomalies are too great to be explained isostatically. The radioactivity of the lighter granites is 2-3 times that of the heavier basalts; granite predominates below the continents, basalt below the oceans, the beds of which are further cooled by the water. Temperature is therefore higher under the continents than at the same level under the oceans, and convection currents will be caused, reaching down to the discontinuity layer at 1,200 km inferred from seismological results. By reason of the high viscosity and slow velocity of the material, it is shown mathematically that this leads to positive anomalies and descending currents (at a velocity of the order of 1 cm/ann.) under the oceans and the reverse under the continents. Secondary but similar currents would also be developed by temperature disturbances accompanying tectonic processes. Such currents would also cause tangential stresses, and slips of the whole crust relative to the core of the earth.

## (2073) DER EINFLUSS DES ERDMAGNETISCHEN FELDES AUF SCHWEREMESSUNGEN MIT INVARPENDELN

## (INFLUENCE OF THE EARTH'S MAGNETIC FIELD ON GRAVITY MEASUREMENTS WITH INVAR PENDULUMS)

By Heinz Lettau

Zeitschrift für Instrumentenkunde, Berlin, vol. 54, no. 4,
1934, pp. 101-7

.Discussions of the influence of the earth's magnetic fields upon the nickel-steel pendulums have so far been based exclusively on laboratory tests. Gravity measurements by H. Schmehl in 1930 with the invar-pendulums and bronze-pendulums confirmed the previous results and justified their use under natural conditions. Estimates are made on the mutual magnetic influence by using two pendulums.--Author's abstract, translated by W. Ayvazoglou.

## (2074) RAPID ADJUSTMENT OF OBSERVATIONS IN NETWORK OF GEOPHYSICAL STATIONS BY THE METHOD OF LEAST SQUARES

By C. Lancaster-Jones

Proceedings of the Physical Society, London, vol. 45,
Nov. 1, 1933, pp. 792-807

A frequent problem in geodesy and geophysics concerns the adjustment of a set of values for a physical magnitude at a number of stations. The values are obtained from other observed magnitudes by computations involving the geometrical links of the station network, and there is ambiguity on account of the multiplicity of connections. Since the magnitude desired is single-valued at each station, the values obtained are usually adjusted by the method of least squares. Where the number of stations is large and the network complex the normal equations for least-square adjustment are very numerous, and their solution by standard procedure is tedious.

The paper develops a method of establishing the normal equations and solving them by successive approximations which is simple, rapid, and satisfactory in practice and is applicable to any network, however large and complex. Although particular attention is focused on the problem of obtaining isogams from observations of gravity gradients in applied geophysics, the method has obvious applications in other fields where the mathematical conditions are similar.--Author's abstract.

## (2075) NOTE ON THE BEHAVIOR OF THE EÖTVÖS GRAVITY BALANCE IN FLUCTUATING GRAVITATIONAL FIELDS

By A. O. Rankine

Proceedings of the Physical Society, London, vol. 46,
part 2, no. 253, pp. 137-40

In this note attention is directed to the semidiurnal variation of gravity t a point on the earth's surface, due to lunar attraction and recently measured y Loomis. It is shown that this temporal variation of "g" is much larger than he spatial differences measured by the Eötvös gravity balance but that it prouces no effect on the balance. This constitutes an experimental proof of the ower of the Eotvos instrument to discriminate between space and time changes f terrestrial gravitation.--Author's abstract.

## 2. MAGNETIC METHODS

## (2076) KANGOLOVO EXPERIMENTAL MAGNETOMETRIC STATION (IN RUSSIAN)

Editorial note

Razvedka Nedr, Moscow, no. 15, October 1933, p. 55

A special magnetometric station has been established and equipped with ecessary instruments at Kangolovo (near Leningrad) with the following purposes:

1. Investigation and adjustment of all kinds of magnetometers, variometers, elmholtz coils, etc.

2. Determination of magnetic susceptibility of rocks and ores.

3. Determination of magnetic susceptibility and of the coercive force of erromagnetic materials.

4. Determination of the magnetic moments of all kinds of magnets.

5. Construction of new magnetometric apparatus.

6. Investigation of various materials with regard to their magnetizaility.--W. Ayvazoglou.

## (2077) CHROMITE DEPOSITS IN GEI-DARA, KURDISTAN (IN RUSSIAN)

By E. Bagratuni

Razvedka Nedr, Moscow, no. 19, December 1933, pp. 19-21

Bagratuni discusses the preliminary results of the magnetometric survey n 1933 in the search for chromite deposits in Gei-dara. Schmidt's Z-variometer was used. Intervals between the observation points were 10 meters. These intervals were reduced to 5 m in the regions of anomalies. About 0.6 $km^2$ was surveyed. The magnetic effect of chromite deposits was high if compared with that produced by surrounding rocks. A series of anomalies was discovered in regions covered with alluvium.

A possible amount of chromite ores up to 15 to 20 thousand tons is estimated.

Final conclusions will be made after the data obtained from the survey are interpreted.--W. Ayvazoglou.

### (2078) SUR LE MAGNETISME DES BASALTES D'ALSACE

### (ON THE MAGNETISM OF BASALTS IN ALSACE)

By J. Rothé

Comptes rendus de l'Académie des sciences, Paris, vol. 198, no. 16,
(Apr. 16) 1934, pp. 1443-4

The author investigated magnetically the three locations of the tertiary basalts known in the Alsace (Gundershoffen, Riquewihr, Orbey). The results of his measurements carried out by Schmidt's variometer and the conclusions drawn by the author are discussed.--W. Ayvazoglou.

### (2079) MAGNETISCHE EIGENSCHAFTEN DER FERROMAGNETISCHEN MINERALIEN IN DEN GESTEINEN

### (MAGNETIC PROPERTIES OF THE FERROMAGNETIC MINERALS IN ROCKS)

By J. G. Koenisgsberger

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934,
pp. 385-94

Eruptive rocks show residual magnetization (Jn) of a magnitude mostly but not always dependent on their geological age: Old rocks often have a weaker, younger rocks a stronger, Jn. This Jn is induced on the ferromagnetic mineral of the rocks during the cooling from the higher Curie-point to 20° in the earth field $H_t$. To explain the phenomena mentioned above it is necessary to study first the ferromagnetic properties of the principal minerals in the same state as in the rocks, that is, as powder or little crystals separated by diamagnetic matter. Observations were made on magnetites and on pyrrhotite, where the form--that is, the demagnetization coefficient--has a great influence on the magnetic effects and also on hematite (oligist), ilmenite, and the so-called titanomagnetite, which have all a lesser susceptibility K and therefore show little or no influence of the form.

Characteristic parameters which are independent of the concentration of the minerals in a rock were chosen and measured, such as: $J_{rs} = K_0 = R$ ($J_{rs}$ is the maximum apparent residue and $K_0$ the apparent susceptibility); $J_{rt} = J_k = Q_t$ ($J_k = K_0 . H_t$; $J_{rt}$ is the apparent residue obtained by cooling in the laboratory in the field $H_t$); $J_{rt} = J_{rs} = S_t$.--Author's abstract.

## (2080) PROPRIÉTÉS MAGNÉTIQUES DES ROCHES SEDIMENTAIRES DU BASSIN PARISIEN

## (MAGNETIC PROPERTIES OF SEDIMENTARY ROCKS OF THE PARIS BASIN)

By E. Thellier

Annales de l'Institut de Physique du Globe de l'Universite de Paris,
vol. 11, 1933, pp. 101-2

Modifications of the magnetometer used previously by E. Thellier (see Geophys. Abs. 56, p. 903) are described. Results of the measurements of the magnetic properties of sedimentary rocks of the Paris Basin are given.--W. Ayvazoglou.

## (2081) STRUCTURAL TRENDS ON THE GULF COAST, PARTS I AND II

By W. P. Jenny

Oil Weekly, Houston, vol. 74, nos. 5 and 6, 1934,
pp. 33-40 and 23-24

The first part of the article contains the interpretation of the magnetic regional trends on the Gulf coast, revealed by detailed magnetometer investigations between Victoria, Texas, and New Orleans, La.

The accompanying magnetic map contains information gained from extensive regional and local field work. A number of geophysical and geological assumptions were necessary to interpret the magnetic map. These assumptions are general and, according to the author, subject to error. Very close cooperation between the geophysical and the subsurface geologist is required for interpretation of the magnetic data.

In discussing the trends the author notes that no domes and only a few prospects are to be found within the areas of strongest magnetic intensity between Houston-Beaumont, north of Lake Charles and west of Napoleonville, but that, on the contrary, the salt domes are grouped around the supposedly deepest areas of the respective basins. It is the impression of the author that large salt masses, which were originally deposited in greatest thickness in the general area of the basins, were later squeezed out by increasing overburdens. The salt masses then flowed toward regionally higher areas, if they were not trapped by faults or folds, which originated through the settling of the overburden or through deeper sources. This assumption would explain the large number of gravimetrically known salt ridges; it would explain the large accumulation of shallow domes on the platforms and would explain further why the Boling dome, for example, though along a salt ridge, lies in a regional gravimetrically high area.

Comparison of "known" regional gravimetric trends with the magnetic picture also emphasizes the danger of relying too much upon such a supposed knowledge of "regional" gravimetric trends for structural interpretation of local gravimetric anomalies.

In the second part of the article the author states that the magnetic method may yet prove to give considerable assistance in the search for local or semiregional structures in the deep sedimentaries of the Gulf coast and similar areas.

As an example of the interesting information which may be gained by accurate magnetometer surveys on local Gulf coast structures, a map showing torsion-balance gradients, magnetometer data, and magnetic profiles for Iowa, Welsh, and Roanoke prospects in Louisiana is added.--W. Ayvazoglou.

## (2082) - MAGNETISK GULLSKJAERPING I FINNMARK

## (MAGNETOMETRIC PROSPECTING FOR GOLD IN FINNMARK)

By Per Sandvik

Tidsskrift for Kjemi og Bergwesen, Oslo, vol. 12, no. 7, 1932,
pp. 111-2

The article points out the possibility of locating the richest parts of the gold-bearing alluvials in Finnmark, Norway, by means of magnetometric survey.--Author's abstract.

## (2083) NEW MAGNETOMETERS

By Per Sandvik

Reprint from Tidsskrift for Kjemi og Bergvesen, no. 4, 1934,
6 pp.

Magnetometers (especially Schmidt's), their handling, and range of application are described.--Author's abstract.

## 3. SEISMIC METHODS

### (2084) UNDULATORY DEFORMATION OF THE EARTH'S CRUST ALONG THE COAST OF THE JAPAN SEA

By Chuji Tsuboi

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 12, no. 2, 1934, pp. 174-94

Slow deformation of the earth's crust which took place within the last
to 40 years along the coast of the Japan Sea is discussed by Tsuboi, based
the data obtained from the first and last levelings by the Imperial Japa-
ese Military Land Survey in 1887-99 and 1927-30, respectively.

As possible explanation of the changes occurring beneath the earth's
urface the author assumes the existence of a series of parallel wave-line de-
ormations or a mosaic distribution of areas of upheaval or depression.
suboi concludes that he reserves for the present any theories concerning the
wave" but merely calls attention to the existence of such a kind of crustal
formation as an indisputable physical fact.--W. Ayvazoglou.

### (2085) ACCELERATION OBSERVATIONS OF EARTHQUAKE SHOCKS IN THE CITIES OF TOKYO AND YOKOHAMA

By Mishio Ishimoto

Bulletin of the Earthquake Research Institute, Tokyo,
vol. 12, no. 2, 1934, pp. 234-48

Ten acceleration seismographs were installed in Tokyo and Yokohama to
tudy the earthquake shocks, which are not always the same in different parts
f these cities. The observations were made during 1932-33, and a certain
umber of seismic records corresponding to each station were obtained.

To make clear the characteristics of the seismic shocks four kinds of
nvestigations were made: 1, Maximum acceleration; 2, period of shocks of
reat acceleration; 3, predominant period of the shocks; and 4, frequency of
aves corresponding to each degree of acceleration.--Author's abstract, trans-
ated by W. Ayvazoglou.

### (2086) PROPAGATION OF ELASTIC WAVES OVER THE PLANE SURFACE OF A SEMI-INFINITE BODY

By T. Sakai

Proceedings Phys. Math. Soc., Japan, vol. 15, August 1933,
pp. 291-327

Assuming a dilatational disturbance at a point (the focus) below the plane
urface of a semi-infinite, isotropic, homogeneous, elastic body, R,r, being

the distances of the point on the surface under consideration from the focus and epicenter respectively, and d the depth of the focus, it is shown that near the epicenter there is only a P wave of amplitude proportional to $1/R$; but far therefrom there are also Rayleigh and S waves, of amplitudes proportional to $1/\sqrt{r}$ and $1/r^2$, respectively, while that of P is proportional to $1/R$ when d is large compared with the wave length, but small compared with r, but to $1/r^2$ when d is small. In the intervening region it can only be stated that Rayleigh and S waves do not appear unless r is $> V_3 d/\sqrt{V_1^2-V_3^2}$ and $V_2 d/\sqrt{V_1^2-V_2^2}$, respectively ($V_1$, $V_2$, $V_3$ being the velocities of propagation of P, S and Rayleigh waves, respectively). Profiles of wave forms are given.--Abstract, signed C.A.S., reprinted from Science Abstracts, vol. 36, no. 431, 1933, p. 1189.

## (2087) LE DÉBUT DES ONDES DE LOVE

## (THE ORIGIN OF LOVE'S WAVES)

By J. Coulomb

Comptes rendus de l'Académie des sciences, Paris, vol. 198, no. 17, (Apr. 23), 1934, pp. 1525-7

In one of his previous articles (see Geophys. Abs. 59) Coulomb presented an argument in favor of the existence in Love's waves of discontinuous trains. The trains did not appear from the beginning. On the contrary the first waves showed a pseudoperiod decreasing constantly, with an apparent amplitude increasing constantly. The true amplitude should increase also, but not so rapidly.

Jeffreys (see Geophys. Abs. 30) found by calculation the source of the beginning by studying the effect caused by a sudden change upon a homogeneous medium surmounted by a plane layer.

In this article the author gives a mathematical discussion of the question and concludes that the result agrees closely with that obtained by Jeffreys.--W. Ayvazoglou.

## (2088) MODERN SEISMOLOGY

By F. J. Scrase

Science Progress, London, vol. 29, no. 113, 1934, pp. 41-51

In the present article the author gives a brief outline on seismology.

Items of the article: (1) The growth of modern seismology; (2) how earthquakes occur; (3) the seismograph; (4) earthquake waves; (4) waves in the earth's crust; (5) waves in the interior of the earth; (6) deep earthquakes; (7) earthquake periodicities; (7) microseisms.

Author's conclusion reads as follows:

It will be realized from this brief outline that modern seismology affords an excellent illustration of the progress which can be made by the application of sound physical principles to a subject which hitherto had no claim to be recognized as a science. From the foundations so firmly laid by Milne, seismology has developed in accordance with the requirements of modern investigation and has become a quantitative science well worthy of its place as a branch of geophysics. It has already thrown much new light on the properties and structure of our globe, and it provides the most hopeful means of proving the secrets of the earth's interior.

## (2089) A NEW-TYPE, LONG-PERIOD, VERTICAL SEISMOGRAPH

By Lucien J. B. LaCoste

Physics, Lancaster, vol. 5, no. 7, 1934, pp. 178-80

A single-spring vertical motion seismograph of theoretically infinite period is described. Actual periods of over a minute have been obtained with a seismograph of this type, while for a period of 37 seconds the period was found to be constant to within 1 second for a variation of 9° in the angle between the seismograph arm and the horizontal. A special type of spring is required. The method of winding such a spring is described and a possible method of temperature compensation given.--Author's abstract.

## (2090) PROPAGATION OF ELASTIC WAVES IN ICE. PART II

By Maurice Ewing and A. P. Crary

Physics, Lancaster, vol. 5, no. 7, 1934, pp. 181-4

Flexural waves.- A seismograph, used to study propagation of explosion-generated waves in a sheet of ice on a lake, revealed the extend of flexural waves. These waves showed marked dispersion, the group velocity being represented approximately by the empirical formula $U = 221\ (en)^{\frac{1}{2}}$, where e is the thickness of the ice in feet and n is the frequency. A theoretical formula is developed by which the velocity of these waves may be calculated from the elastic constants of ice and water.

Transverse waves.- By suitable orientation of the seismograph it was possible to detect transverse waves polarized horizontally, in the sheet of ice. The velocity of transverse waves was found to be 6,057 ft./sec., which checks within about 3 percent with the value of velocity calculated from the elastic constants of ice as reported in part I. (see Geophys. Abs. 64).--Author's abstract.

## 4. ELECTRICAL METHODS

### (2091) RESONANCE INDUCTION METHOD OF RADIO-SURVEYING FOR ORES (IN RUSSIAN)

By K. K. Korovin

Razvedka Nedr, Moscow, no. 7, May 1934, pp. 39-43

In 1928 the author made laboratory tests to study the character of the change in the electromagnetic fields and in the fields of radiation, within the limits of the spectrum of radiofrequency, caused by the influence of different masses. He discovered that the electromagnetic field is subject to deformation by different masses, the frequency being strictly determined, depending on the physical properties of these masses. Based on the principle of the deformation of the electromagnetic field he studied the influence of the different masses upon the field of radiation. He proved that the same principle of deformation may be applied also to the field of radiation. According to his tests, the change in the resistance of the mineral under investigation in dependence of frequency is in complete accord with indications of deformation of the electromagnetic field, having the same frequency, under the influence of the same mineral. Characteristic conditions of the deformation of the field of radiation at different frequencies under the influence of various minerals (pyrite, chalcopyrite, galenite, and some others) were determined by the laboratory tests. Based on these characteristic reactions it was possible to find the natural concentrations of these minerals in the field.

This method was first called the method of the "Resonance of metals" (R M). Korovin believes that it would be more correct to call this method the "Resonance induction method of radio-surveying".

The apparatus used in this method is described briefly. The method was tested in 1932 on the Boshche-Kul copper deposits. Two square kilometers were surveyed and the contours of the general pyritiferous deposit of the area, and of ores containing copper, were determined. The correctness of the contours established was proved by borings. A map showing the contours determined by the RM-method, as well as those determined by borings, is given.

The author mentions also the possibility of applying this method to the search for sulphur and arsenic; of course, special modifications of the apparatus are necessary for each case.

The author concludes that the results obtained so far prove the possibility of application of the RM-method, with its variations, not only to determine the existence of the ore and its contours but also to determine the characteristic properties of the ore. Further scientific development of this new method is, of course, necessary.--W. Ayvazoglou.

## (2092) EARTH-RESISTIVITY SURVEYS; THE LOCATION OF FAULTS

By Granville Poole, J. T. Whetton, and A. Taylor

Colliery Guardian, London, vol. 148, no. 3818, 1934, pp. 389-90

This article refers to the paper entitled Earth-Resistivity Surveys on Various Geological Structures Related to Mining, by the same authors. (See Geophys. Abs. 62, p. 1167.)

The application of geophysical methods in coal mining is discussed. According to the authors, the earth-resistivity method is the most adaptable and the cheapest for the average case of determining a coal-measure fault.

The principle of probe-method of resistivity surveying is briefly discussed. The two main methods, (1) the single-electrode probe method and (2) the expanding-electrode method, are explained. The results of resistivity investigations, as described in the main paper, are mentioned.--W. Ayvazoglou.

## 6. GEOTHERMAL METHODS

## (2093) NOTE ON THE THERMAL HISTORY OF THE EARTH

By A. N. Lowan

Physical Review, Lancaster, vol. 45, no. 12, 1934, pp. 899-900

In a previous paper (Lowan, on the cooling of a radioactive sphere, see Geophys. Abs. 64) the problem of the cooling of the earth has been treated under the simplifying assumption that the surface of the earth is either permanently at 0° or that it radiates into a medium at 0°.

The object of the present note is to amplify the treatment of the previous paper by taking into account the heat received from the sun.

A mathematical discussion is given.--W. Ayvazoglou.

## (2094) CONTINUOUS GENERATION OF HEAT IN CERTAIN SILICATES

By E. A. Harrington

Proceedings of the American Philosophical Society, vol. 72, no. 5, 1933, pp. 333-49

The existence of a continuous generation of heat in certain silicates has been investigated by putting the material in a well-insulated calorimeter supported in a jacket maintained at 0° C. Temperature differences between calorimeter and jacket were observed by a thermoelement connected directly to a sensitive galvanometer. For a few materials a positive result was indicated. Some consequences of such a result have been examined.--Author's abstract.

## (2095) ON GEOPHYSICAL METHODS OF PROSPECTING FOR CHROMITE (IN RUSSIAN)

Editorial note

Razvedka Nedr, Moscow, no. 12, August 1933, p. 46

The possibility of discovering chromite deposits by geophysical methods is discussed. Based on the tests carried out in several places it was established:

Gravimetric methods can be used successfully for discovering chromite lenses having a volume of over 2,000 $m^3$, the center of the orebody lying at a depth about 20 m. The distance between the stations should be 25 m.

Magnetic methods may discover lenses having a volume of over 2,000 $m^3$, under the conditions that the center of the orebody lies at a depth not over 11 m and its upper border is at about 5 m from the surface of the earth. The stations should be located at 20-m intervals.

Electric methods are not recommended under the conditions under which the tests were carried out, owing to the insignificant difference in the specific resistance between the chromite bodies and the rocks surrounding them.--W. Ayvazoglou.

## (2096) ACTIVE DEVELOPMENT OF BRAZIL'S MINERAL RESOURCES PLANNED BY GOVERNMENT

By Mark C. Malamphy

Mining and Metallurgy, New York, vol. 15, no. 331, 1934, pp. 300-2

In this article the author describes the measures planned by Government, for active development of Brazil's mineral resources. The Geological and Mineralogical Service of Brazil is reorganized, and in its place a new National Department of Mineral Products (Departamento Nacional do Producto Mineral) is created. Geophysical methods of prospecting are included in the plan, especially for the search of petroleum. Gravimetric, seismic, and magnetic methods are considered in the first place.--W. Ayvazoglou.

## (2097) SOME COMMENTS UPON APPLIED GEOPHYSICS IN THE PAST YEAR, 1933

By F. W. Lee

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 39, no. 2, 1934, pp. 127-131

From a series of articles the author briefly discusses the progress attained by the applied geophysics during 1933.--W. Ayvazoglou.

## (2098) GEOPHYSICS

By H. Shaw

Journal of the Institution of Petroleum Technologists, London,
vol. 20, no. 128, 1934, pp. 625-35

The author gives a review of articles on geophysical methods of prospecting carried out during the years of 1933 and 1934. A list of 60 articles to which references are made is added.

The author welcomes the tendency toward more open and frank discussion on the methods and the principles of interpretation by those engaged in the various branches of geophysical prospecting. The publication of papers giving the technique of the various methods and the discussions of their possibilities and shortcomings have done much, according to the author, to eliminate the unhealthy condition of supposed secrecy that has hitherto prevailed.--W. Ayvazoglou.

## (2099) GEOPHYSICAL PROSPECTING A NEW SCIENCE

By Russell C. Fleming

Compressed Air Magazine, New York, vol. 39, no. 3, 1934, pp. 4365-73

Brief explanation of various geophysical methods of prospecting, their application, and instruments used is given. The article is illustrated by photographs.--W. Ayvazoglou.

## 9. NEW BOOKS

(2100) Buehler, H. A. Biennial Report of the State Geologist, Missouri Bureau of Geology and Mines, Rolla, Mo., 1933, price 10 cents. The report contains maps and description of geophysical studies carried out in various areas.

(2101) Ghirin, S. K. Book of References for Geophysical Surveyors (in Russian). The book is compiled by a number of Russian geophysicists and is edited by Ghirin. It consists of four separate parts dealing with geophysical methods of prospecting. The parts are published by the Mining, Geological, and Oil Service of the U.S.S.R., Moscow-Leningrad-Novosibirsk, 1933. Parts 2, 3, and 4 are issued: Part 2, Gravitational Methods, 185 pp., price Rubles 2.90; Part 3, Magnetic and Radioactive Methods, 183 pp., price Rbls. 2.75; and part 4, Seismic and Electrical Methods, 199 pp., price Rbls. 3.25.

(2102) Grammakov, A. G. - Field Radiometric Measurements by the Universal Apparatus (in Russian). Published by the Geophysical and Prospecting Service, Moscow-Leningrad, 1930, 45 pp., price 0.50 kopek. The book contains information on the method for determining the radioactivity of various materials, as well as references necessary for interpretation of data obtained by measurements.

(2103) Lepeshinskiy, Yu.N. Electrical Method of Prospecting by Alternating Current (in Russian). Published by the Geophysical and Prospecting Service, Moscow-Leningrad, 1933, 176 pp., price Rubles 4.25. Systematic explanation of the methods for working out and interpretation of field data is given.

(2104) Mikhailov, J. G. and Pylaev, A. M. Induction Method of Prospecting for Ores (in Russian). Published by the Mining, Geological, and Oil Service, Leningrad-Moscow-Novosibirsk, 1933, 57 pp., price Rubles 2.50. This is a handbook for technical chiefs of geophysical parties working by the induction method. The method and the technique of the work are discussed.

(2105) Munn, Leonard. Geology of the Underground Water Resources of the Hyderabad State and Notes on Well Sinking. Water-Supply Paper 1, 204 pp., 14 tables, 12 plates, 4 photoplates, 23 figs. The paper is published in The Journal Hyderabad Geological Society, Hyderabad-Deccan, 1934, vol. II, Part 2. Copies may be obtained at The Office, Hyderabad Geological Survey, Lingsugur, Raichun and Finance Department, Hyderabad, price £ 0/6/5.

Contents: Chapter I. Introduction; Chap. II. Underground water supply; sources of underground water; Water-finding. Chap. III. Geological structures and weathering; pre-Cambrian and Sedimentary rocks; Pleistocene and recent formations; Quality of water. Chap. IV. Well sinking. In Chapter II, under the heading "Water Finding", the author mentions that valuable indirect assistance in the location of underground water supply may be obtained from geophysical methods of prospecting.

(2106) Petrovsky, A. A., and Nesterov, L. Ya. Electrical Prospecting by Direct Current (in Russian). Published by the Geological and Prospecting Service, Moscow-Leningrad (Leningrad Mining Institute), 1932, 165 pages, price Rubls: 2.50. Contents: (1) Natural field; (2) theory of the natural field; and (3) resistance method.

(2107) American Association of Petroleum Geologists, Problems of Petroleum Geology, box 1852, Tulsa, Okla., 1934, 1,100 pp., 200 illus., price $6.00 (to members and associates $5.00). This volume is edited by W. E. Wrather and F. H. Lahee. It contains 43 papers prepared by 47 authors. Outline of contents: I, History; II, origin and evolution of petroleum; III, migration and accumulation of petroleum; IV, relations of petroleum accumulation to structure; V, porosity, permeability, compaction; VI, oil-field waters; VII, subsurface temperature gradients.

(2108) Poletaev, S. P. Practical Handbook for the Work with the Gravitational Variometer. Published by the Mining, Geological, and Oil Service, Moscow-Leningrad, 1932, 100 pp., price Rubles 1.50. The handbook is assigned for use by surveyors in the field.

2109) Selskiy, V. A. Geophysical Work in the Service of Petroleum Industry. Published by the Mining, Geological, and Oil Service, Moscow-Leningrad, 1933, 128 pp., price Rubles 2.80. Reviews gravimetric, seismic, electrical and magnetic work carried out in various oil regions of the U.S.S.R. is given. The analysis of the results obtained and the achievements in discovering and study of oil-bearing regions are examined. The organization of geophysical parties and the cost are described in detail.

2110) Sokolov, P. T. Physical and Theoretical Principles of the Seismic Method of Geological Survey (in Russian). Published by the Mining, Geological, and Oil Service of the U.S.S.R., Leningrad-Moscow-Novosibirsk, 1933, 216 pp., price Rbls. 3.00.

## 10. PATENTS

### (2111) NOUVELLE MÉTHODE DE PROSPECTION ET DISPOSITIF POUR SA MISE EN OEUVRE

(A NEW METHOD OF PROSPECTING AND THE APPARATUS USED)

Alphonse Koessler, residing in France (Bas-Rhin)

rench Patent 758,393 Issued Jan. 15, 1934

Relates to new electrical method of prospecting. Consists of transform-
ng changes of electrical intensity resulting from differences of conductivity
f subsoil investigated into luminous intensities; of representing variations
f luminous intensities by means of neon lamps or other suitable means; and of
roducing them on a film, a plate, or sensitized paper.

Claims allowed - 3.

### (2112) PROCÉDÉ THERMOMÉTRIQUE POUR LA DÉTERMINATION DES CIRCULATION DE FLUIDES DANS LES SONDAGES

(THERMOMETRIC METHOD FOR DETERMINING THE CIRCULATION OF FLUIDS IN WELLS)

Société de prospection électrique (Procédés Schlumberger) of France (Seine)

rench Patent 759,265 Issued Jan. 31, 1934

Relates to utilization of thermal phenomena produced within a well by the
irculation of fluids. The measurements are carried into effect continuously
n the part of the well to be investigated and are manifested by a continuous
iagram of temperatures along this part of the well. A suitable electrical
hermometer (resistance thermometer or a thermocouple), connected with the
egistering apparatus on the surface of the earth, is moved accordingly inside
f the well.

Claims allowed - 4.

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October 1934
UNITED STATES BUREAU OF MINES
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# GEOPHYSICAL ABSTRACTS
MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

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## 1. GRAVITATIONAL METHODS

### (2113) EXPERIMENTELLE UNTERSUCHUNGEN AN QUARZGLASPENDELN MIT QUARZGLASSCHNEIDEN

### (EXPERIMENTAL INVESTIGATIONS ON QUARTZ-GLASS PENDULUMS WITH QUARTZ-GLASS KNIFE EDGES)

By O. Meisser

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 252-7

Eight quartz-glass pendulums were tested by the author for determining their constancy. According to the results of measurements the constancy of pendulums with quartz-glass knife edges was insufficient. Steel must be considered a better material for knife edges than the brittle substances.--W. Ayvazoglou.

### (2114) DER EINFLUSS DES ANTRIEBS AUF DIE SCHWINGUNGSDAUER EINES PENDELS

### (THE INFLUENCE OF THE IMPULSE UPON THE PERIOD OF OSCILLATION OF A PENDULUM)

By H. Schmücking and O. Meisser

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 258-62

The relation between the power of the impulse and the logarithmic decrement is determined. The correction of the period of oscillation produced by an impulsive force outside the center position of the pendulum is derived also.--Author's abstract, translated by W. Ayvazoglou.

### (2115) BEITRÄGE ZUM AMPLITUDENREGISTRIERVERFAHREN (KOINZIDENZREGISTRIERVERFAHREN)

### (CONTRIBUTIONS TO THE AMPLITUDE-RECORDING METHOD) (COINCIDENCE-RECORDING METHOD)

By H. Martin

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 269-73

The difference between the generally used method of recording (recording on a continuously running film) and the amplitude-recording method is discussed.

The results of investigating the Riefler clock concerning the relation between the impulse and the period of oscillation of a pendulum is shown in a figure.--Author's abstract, translated by W. Ayvazoglou.

### (2116) BERECHNUNGEN ZU EINER HEBELWAAGE FÜR SCHWEREGRADIENTENBESTIMMUNGEN

### (CALCULATIONS RELATING TO A BALANCE FOR DETERMINING GRAVITY GRADIENTS)

By Gerhard Schmerwitz

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 274-95

A Joly balance connected to a horizontal pendulum to increase sensitivity as used for preliminary tests in view of the improvement of this instrumental ombination. To prove the formulas, theoretical considerations of the behavior f this system were followed by practical experiments. As far as mathematical esults are concerned the equations for the damped swinging show that the nflection points of the horizontal pendulum and the zero position of the alance may be found also from the position of the indicator. The second hapter deals with the considerations to be taken into account when spring evices instead of the usual knife edges are used for the external supports. he different forms of bending these metal stripe springs and the variability f the bending axis are discussed. The replacement of the middle knife by a pring did not give any advantage. The equations for a balance with middle nife support and two metal springs at the extremities have been determined; onsiderations on the choice of the dimensions of these metal stripe springs onclude the article.--Author's abstract.

### (2117) RELATIVE SCHWEREMESSUNGEN IN OSTPOMMERN

### (RELATIVE GRAVITY MEASUREMENTS IN EAST POMERANIA)

By H. Schmehl

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 316-32

The author describes the gravity observations made by him in East omerania near Lake Leba. The results of the measurements and the anomalies alculated with the formulas given by Helmert are shown in a table. The reatest positive gravity anomaly is situated nearly at the same place where . Reich has found a great positive magnetic anomaly. The mean gravity radient is there about .1 mgal/ 1 km. It must be expected that in the northestern part of Lake Leba the crystalline subsoil is relatively close to he surface of the earth.--Author's abstract.

### (2118) DREHWAAGEMESSUNGEN BEI LEBA (OSTPOMMERN)

### (TORSION BALANCE MEASUREMENTS NEAR LEBA, EAST POMERANIA)

By Karl Jung and Reinhard Köhler

Berträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 333-7

Near Leba in Pomerania H. Reich has found an anomaly of magnetic vertical ntensity. To investigate the field of gravity, measurements with the Eötvös torsion balance were made in the same district. The gradients were in good agreement with pendulum observations made by H. Schmehl. Between Bollenz and Leba the gravity decreased in an easterly direction, the same as the anomaly of the vertical intensity.--Author's abstract.

### (2119) UBER DIE GENAUIGKEIT DER BESTIMMUNG EINFACHER MASSENFORMEN AUS DEM SCHWEREGRADIENTEN

### (ON THE ACCURACY OF DETERMINING SIMPLE MASS FORMS FROM GRAVITY GRADIENTS)

By Karl Jung

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 338-46

A mathematical discussion on the influence of the inaccuracy of observations on the determination of simple mass forms from gravity gradients is given.--Author's abstract, translated by W. Ayvazoglou.

### (2120) VERGLEICH VON PENDEL UND DREHWAAGENMESSUNGEN

### (COMPARISON OF PENDULUM AND TORSION-BALANCE MEASUREMENTS)

By K. Mader and R. Norz

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 4, 1934, pp. 429-57

Pendulum measurements confirmed that the area of the gravity disturbance found by R. Schumann with the torsion balance south of Vienna had a greater extension. The residual gravities (Schwerereste) were calculated by means of Helmert and Ackerl formulas.

Perceptions of theoretical conditions obtained by F. Hopfner were also confirmed after elaboration of the observations.--Author's abstract.

### (2121) UBER DIE ELASTISCHE DEFORMATION DER ERDKRUSTE DURCH LOKALE BELASTUNG MIT BESONDERER BERUCKSICHTIGUNG DER SCHNEEBELASTUNG DER ALPEN

### (ON THE ELASTIC DEFORMATION OF THE EARTH'S CRUST CAUSED BY THE LOCAL LOAD WITH SPECIAL CONSIDERATION OF THE LOAD PRODUCED BY THE SNOW IN THE ALPS)

By F. Steinhauser

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 4, 1934, pp. 466-83

The deformation of the earth's crust produced by local loads is examined. The vertical displacement of the earth surface is investigated, as produced: (1) By the load of the snow in the Alps, (2) by a lake, and (3) by a large city. Supposing that the weight of the snow in the Alps is spread on a rectangular area 200 km wide and 700 km long and that the depth of the snow ncreases parabolically from zero at the exterior part to 4 m in the middle, here results a total load equal to about 1.1 x 10" tons. In that way a ertical displacement of the earth's surface equaling w = 3.99 cm is produced t the middle point of the loaded area. The displacement decreases gradually oward the sides and at a distance of 1,000 km still amounts to 0.38 cm.

By the way of comparison the author discusses the influence of the disribution of the load in connection with the deformation caused by the weight f the water of Lake Neusiedl (w = 0.32 cm.) and of Vienna (w = 0.14 cm.) n conclusion, the author basing his calculations on a deduction by Nishimura, hows that under the supposition that the coefficient of rigidity increases t a depth of 50 km desultorily to its double value, the deformation of the arth's surface is considerably smaller.--Author's abstract.

## 2. MAGNETIC METHODS

### (2122) DER MAGNETISCHE MITTELPUNKT DER ERDE UND SEINE BEDEUTUNG

### (THE MAGNETIC CENTER OF THE EARTH AND ITS IMPORTANCE)

By Adolf Schmidt

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 3, 1934, pp. 346-58

The author shows that the magnetic center of a magnet introduced by W. homson is characterized by the fact that, with respect to its origin of oordinates, the member of the second order of the potential series has the mallest value.

General formulas for calculating its coordinates based on this supposiion are derived; they are applied to the earth's magnetic potential. Finally he importance of the magnetic center for the clear explanation of a charcteristic feature of the earth's magnetic center is discussed, and it is lso considered whether and to what extent it may be important from the viewoint of physics.--Author's abstract, translated by W. Ayvazoglou.

### (2123) DIE REICHWEITE EINER MAGNETISCHEN NORMALSTATION

### (THE RANGE OF A MAGNETIC NORMAL STATION)

By A. Nippoldt

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 347-52

Owing to the great distances between the stations of a magnetic survey f a country compared with the extension of the land areas, the single staions must have the importance of normal stations. In obtaining this normality it is proposed to obtain the curve integral on all the triangles between he neighboring stations and to set its value equal to zero; that is, to uppose the nonexistence of magnetic fields without a potential.

In this way the normality with regard to the horizontal elements is obtained. Concerning the vertical magnetic elements the single stations must be examined by means of local variometers at the close vicinity of each field station.--Author's abstract, translated by W. Ayvazoglou.

### (2124) ZUE SÄKULARVARIATION DER VERTIKALINTENSITÄT IN DEUTSCHLAND FÜR DIE ZEIT VON 1901 BIS 1931)

### (SECULAR VARIATION OF VERTICAL INTENSITY IN GERMANY FOR THE TIME FROM 1901 TO 1931)

(Preliminary information)

By H. Reich

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 373-84

Based on numerical material obtained by variometer measurements it is shown that the secular change of Z in Germany from 1901 to 1931 cannot be represented by a linear equation.

A map of lines with equal change of the vertical intensity (Z-isoporen) shows that distinct relations with the large geological structures exist. --Author's abstract, translated by W. Ayvazoglou.

### (2125) THE POSSIBLE INFLUENCE OF STRONG MAGNETIC ANOMALIES ON AERONAVIGATION WHEN MAGNETIC COMPASS IS USED (IN RUSSIAN)

By K. Weinberg

Journal of Geophysics, Moscow, vol. 4, no. 1, 1934, pp. 82-8

The author investigates the magnetic field in the atmosphere over strong magnetic anomalies theoretically by computing the gradients Y and Z. After finding the distribution of Y and Z at height h, the author proceeds to compute the distribution at the height $h_2 > h$, and so on. This procedure has been applied to part of the Kursk magnetic anomaly. Formulas for tracing the isogonic lines (in vertical sections perpendicular to the direction of the anomaly) are derived. As an example, the author gives the lines of flight of an airplane approaching the anomaly at height h = 0.5 km.--W. Ayvazoglou.

## (2126) BRIEF OUTLINE ON GEOPHYSICAL WORK CARRIED OUT IN CONNECTION WITH THE KURSK MAGNETIC ANOMALY (IN RUSSIAN)

By K. Bronstein

Razvedka Nédr, Moscow, no. 9, June 1934, pp. 16-20

The existence of the magnetic anomaly near Kursk was known since 1870. Intensive study of this anomaly was made during the years 1930-33 when the following geophysical methods were applied:

| | | |
|---|---|---|
| Magnetic | - | 61,000 stations were investigated |
| Gravimetrical | - | 4,800 stations were investigated |
| Seismic | - | 5,000 stations were investigated |

The borders of the anomaly, as determined up to the present, are shown in a map.

According to the author, it is impossible to give even approximate figures for the reserves of ore, which are certainly immense.

Bronstein recommends continuance of the geophysical work on the Kursk anomaly by using various methods in the same regions.--W. Ayvazoglou.

## (2127) SOME PRACTICAL ASPECTS OF THE THEORY OF THE UNIFILAR HORIZONTAL-INTENSITY VARIOMETER

By S. E. Forbush

Terr. Magn. and Atm. Electr., Baltimore, vol. 39, no. 2, 1934, pp. 135-45

The condition of stable equilibrium of horizontal-intensity variometer, without control magnets, is derived from the potential energy of the system. It is then shown that for quite sensitive variometers the equilibrium may, for a properly adjusted instrument, become unstable for subnormal values of horizontal intensity during magnetic storms. The effect of temperature-compensation magnets on stability is treated. The scale-value equation is developed, and it is shown that the factor which represents the change of scale value with ordinate may be ascertained directly from the value of the horizontal intensity at the instrument, and the optical lever. Tables indicate for three different instruments at widely different locations the agreement between the values calculated in this way and those obtained from the usual adjustment of observed scale values. Finally, the effect of a control magnet upon the conditions for stable equilibrium and upon the scale-value equation are investigated. The possibility of using a control magnet to decrease temporarily the sensitivity of the instrument during severe magnetic disturbances is suggested. Some discrepancies between the scale-value equations derived in this note and those obtained by George Hartnell in his treatise on Horizontal-Intensity Variometers are indicated and explained.--Author's abstract.

### (2128) PRELIMINARY RESULTS OF MAGNETOMETRIC SURVEYING OF MAGNETITE DEPOSITS IN THE REGION OF ENA, PENINSULA OF KOLA (IN RUSSIAN)

By V. Kondratiev

Bulletin of the Leningrad Geological, Hydrological, and Geodetic Trust, no. 1, 1934, pp. 15-16

In the result of magnetometric work in the southwestern part of the Kola Peninsula in the region of iron-ore deposits, newly discovered in the winter of 1933-34, two large anomalies separated by the Lake Kovder were established. According to the magnotometric data, the area of the northern anomaly is 120,000 square kilometers and that of the southern anomaly 350,000 square kilometers. Great extension of the deposit in depth must be supposed from the information obtained, and the total reserves of the ore may be estimated to be over 94 million tons. A further detailed geophysical exploration is recommended.--Author's abstract.

### (2129) ETABLISSEMENT DE LA CARTE DES ANOMALIES DE LA COMPOSANTE VERTICALE DU CHAMP MAGNETIQUE TERRESTRE DANS LES VOSGES

### (THE ESTABLISHMENT OF THE CHART OF ANOMALIES OF THE VERTICAL COMPONENT OF THE EARTH'S MAGNETIC FIELD IN THE VOSGES)

By C. L. Alexanian

Comptes Rendus de l'Académie des Sciences, Paris, vol. 198, no. 19, 1934, pp. 1715-7

The anomalies of the vertical component were measured by Haalck's magnetic variometer. A reduced map of anomalies at 50-gamma intervals is drawn.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (2130) ÜBER DIE AUFZEICHNUNG VON FERNBEBEN MIT KURZPERIODISCHEN SEISMOMETERN

### (ON THE RECORDING OF LONG DISTANCE EARTHQUAKES WITH SEISMOGRAPHS OF SHORT PERIODS)

By Gerhard Krumbach

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 263-8

Using the earthquake of January 15, 1934, as an example, the author shows that seismographs of short periods, such as the 15,000-kg seismograph in Jena, are suitable for furnishing good records of long distance earthquakes. It is therefore possible to use the 15,000-kg seismograph as a universal instrument by applying the mechanical and optical recording synchronously.--Author's abstract, translated by W. Ayvazoglou.

## (2131) EMPFINDLICHKEITSSTEIGERUNG BEI PIEZOELEKTRISCHEN BESCHLEUNIGUNGSMESSERN

## (RAISING OF SENSITIVITY OF PIEZOELECTRIC ACCELEROMETERS)

By A. Herrmann

eiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 296-300

The most favorable directions of cuts and dimensions of quartz and eignette salt (Rochelle salt), for piezoelectric accelerometers are discussed. lates of seignette salt perpendicular to the A-axis and C-axis are not so uitable, while those perpendicular to the B-axis are convenient. In addition, he relation between the pressure and the resulting load and the influence of umidity for the crystals of this direction of the cut is examined.--Author's bstract, translated by W. Ayvazoglou.

## (2132) SEISMISCHE BESTIMMUNG EINER GENEIGTEN GRENZFLÄCHE VON UNBEKANNTER FALLRICHTUNG

## (SEISMIC DETERMINATION OF AN INCLINED BORDER SURFACE OF AN UNKNOWN DIRECTION OF THE FALL)

By F. Gassmann

eiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 358-63

Formulas for determining the depth and the inclination of an inclined order plane between the superficial and covered media are derived under the upposition that the direction of the fall is not known and is to be determined lso. To solve this problem the author applies explosions at four directions f the profiles, 90° distant one from another.--Author's abstract, translated y W. Ayvazoglou.

## (2133) ÜBER DIE ENERGIE DER MINTROPWELLE

## (ON THE ENERGY OF THE MINTROP WAVE)

By W. C. Salm

Berträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 364-72

Taking into consideration the propagation of elastic waves in two homo-eneous and isotropic layers with parallel boundaries the author determines t the stations of observation $P_1$ $P_2 \ldots P_{10}$ the conditions of vertical dis-lacement caused by the Mintrop wave and the reflected wave.

Formulas are given for the extreme values of the Mintrop wave. The real alue of it is supposed to lie between these limits.--Author's abstract, ranslated by W. Ayvazoglou.

### (2134) REPORT ON THE WORK OF THE EARTHQUAKE RESEARCH INSTITUTE, TOKYO IMPERIAL UNIVERSITY, DURING THE YEAR 1932

By Chuji Tsuboi

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 3, 1934, pp. 387-96

This is the sixth report of the series (see Geophys. Abs. 47); it covers the year 1932. Works carried out on seismology, slow crustal deformations, geophysics (tilting of the earth's crust, influence of earthquakes upon fisheries, luminous phenomena accompanying earthquakes), Osaka land slide, mathematics (distribution of elastic stress produced by gravity in a semi-infinite elastic medium near a spherical cavity, problem of reflection and refractions of elastic waves), and geology are examined.—W. Ayvazoglou.

## 4. ELECTRICAL METHODS

### (2135) EIN NEUES ELEKTRISCHES AUFSCHLUSSVERFAHREN MIT GROSSER TIEFENWIRKUNG

### (A NEW ELECTRICAL METHOD OF PROSPECTING AT GREAT DEPTHS)

By Max Müller

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 302-15

If a periodically variable current is flowing through a dynamic rectifier, which is connected with the earth by two nonpolarizable electrodes, there is an additional loss of energy in the rectifier, produced by the electrolytical phenomena incited within the media. By a dynamic process in the rectifier it is possible to measure the inciting currents on the one hand and the electrolytical phenomena on the other hand independently of each other. There also can be measured the charging and discharging time and the velocity of the reaction as a function of frequency and distance of the electrodes.

Field work has been carried out in a well known oil district, showing the connection of the indications with the succession of the layers.--Author's abstract.

### (2136) RECONNAISSANCE OF BURIED RIVER GORGES BY THE EARTH RESISTIVITY METHOD

By Stanley W. Wilcox and G. M. Schwartz

Economic Geology, Lancaster, Pa., vol. 29, no. 5, pp. 435-53

The reasons for selecting the electrical method of prospecting are mentioned. A review of the earth-sensitivity method, the theory of earth-resistivity measurements, and the instrument used are discussed. To test and demonstrate the instrument some laboratory experiments were conducted in a ank filled with water. These experiments are briefly described. Field data re shown in figures representing: Typical earth-resistivity depth profiles ith well log or electrical log plotted adjacent; depth profile and step-raverse profile and interpretation of the Fort Snelling buried gorge, and epth profiles of the Westcott buried gorge.

The authors conclude that the following statements seem warranted by the xperience gained in the work described in this article:

1. The depth of glacial drift overlying the bedrock surface can be etermined with a fair degree of accuracy.

2. The curves indicate rather definitely the character of the glacial rift, that is, whether it is mainly sand and gravel or clay.

3. The resistivity method can be used with a relatively inexpensive achine; the operation is simple and rapid, so that the cost of geologic inormation so obtained is not excessive for general purposes. For specific rojects the method could be used at a considerable saving over blind drillng.—W. Ayvazoglou.

## 5. RADIOACTIVE METHODS

### (2137) LOCATION OF A FAULT BY RADIOACTIVITY

By Alfred C. Lane and W. R. Bennett

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 3, 1934, pp. 353-57

Ambronn states that there should be a notable increase of radioactivity n the neighborhood of a fault. The greater radioactivity of waters near a ault near Howell, Mich., U. S. A., was used to discriminate the faults from sharp anticlinal. The waters came from shallow wells driven through glacial eposits into sandstone.--Author's abstract.

### (2138) MESSUNGEN DER EXHALATION VON RADIUMEMANATION AUS DEM ERDBODEN

(MEASUREMENT OF THE EXHALATION OF RADIUM EMANATION FROM THE SOIL)

By P. Reginald Zupančič

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md.,
vol. 39, no. 1, 1934, pp. 33-46

The amount of radon given off from the soil was measured by a new method. n area of 2,800 cm$^2$ of lawn was covered by a zinc cylinder filled with air ompletely free of radon at the beginning of each experiment. Twelve or 24 ours later the air from the cylinder was introduced, after thorough mixing n an ionization vessel calibrated in curies and measured in the usual way. rom this measurement the amount of radon exhaled from the soil per square centimeter and second can be calculated. The average amount of this exhalation of radon, as observed between December 1932 to July 1933, was $23 \times 10^{-18}$ curie per $cm^2$ per second. Within the period mentioned the minimum of exhalation was found in January and the maximum in June. The exhalation during the day is ~~abo~~ about 1.5 times as much as in the night hours. The maximum value of exhalation during the observation-period of about 6 months exceeds the minimum by about 100 times. Exhalation of radon is mainly governed by the temperature of the soil, increase of this temperature causing an increase of exhalation of radon. Freezing of the soil decreases the amount of exhalation almost to zero. Atmospheric pressure and its variations seem to have secondary importance.--Author's abstract.

## (2139) CONTRIBUTION TO THE QUESTION ON THE MEASUREMENTS OF INTENSITY OF $\gamma$-RADIATION OF ROCKS COVERED WITH OVERBURDEN (IN RUSSIAN)

By G. Gorshkov and N. Liatkovskaia

Journal of Geophysics, Moscow, vol. 4, no. 1, 1934, pp. 70-81

The authors examine the corrections which must be introduced by measuring the intensities of $\gamma$-radiation of rocks when the latter are covered with thin overburden. Theoretical and experimental parts are discussed in the article. According to the results obtained, the authors conclude that in case of thin overburden observations can be made by only measuring the thickness of the overburden without clearing it away.--W. Ayvazoglou.

## (2140) ÜBER DEN GEHALT DER BODENLUFT AN RADIUMEMANATION

## (THE RADIUM EMANATION CONTENT OF THE SOIL-AIR)

By H. Bender

Gerlands Beiträge zur Geophysik, Leipzig, vol. 41, no. 4, 1934, pp. 401-15

The radium emanation content of the air within the soil was investigated by taking samples from different depths (25 to 150 cm) beneath the surface of a lawn-covered ground at Innsbruck (Tirol). From the end of November 1932 to the end of May 1933 the average content of radium emanation was at a depth of 25 to 50 cm $3 \times 10^{-14}$ curie/$cm^3$, of 100 cm $34 \times 10^{-14}$, and of 150 cm $35.10^{-14}$ curie/$cm.^3$ These figures agree well with the results of other observers. The emanation content varies within very wide limits, the variations being greater in smaller depths.

All processes which are apt to clog the soil-capillarities tend to increase the emanation content of soil-air, for instance, freezing of the soil, large water content of the soil (after rain), and snow. The maximum amount of radium emanation within the soil occurs in winter (February and first part of March) and does not coincide with the time of the temperature minimum. The variations of the emanation content do not take place simultaneously in different depths. The regular (seasonal) changes in emanation content are ccasionally disturbed by periods of rainy weather (May 1935). Rising baro-etric pressure increases the emanation content of the air in the soil while ecreasing pressure causes the opposite effect. The smallest emanation con-ent was found when the soil was very dry.

The amount of thorium products (ThB, ThC, etc.) in the samples did not xceed a few percent of the total activity measured in each case.--Author's bstract.

## 6. GEOTHERMAL METHODS

### (2141) CRUSTAL TEMPERATURES

By Harold Jeffreys

The Mining Magazine, London, vol. 50, no. 6, 1934, pp. 344-6

The author indicates how measurements of rock conductivity from mines r borings where the temperature gradient has been determined would help to olve many geological problems.

Some determinations of conductivity of rocks are shown in a table.-- . Ayvazoglou.

## 7. UNCLASSIFIED METHODS

### (2142) GEOPHYSICS AND VICTORIAN DEEP LEADS

Editorial note

Chemical Engineering and Mining Review, Melbourne, vol. 26, no. 310, 1934, p. 379

The note mentions the tests now being made at Allendale on bored deep eads, by Sepp Horwath, of Aktiebolaget Elecktrisk Malmletning, Sweden, to etermine the efficiency of the electrical and magnetic methods of geophysical rospecting in delineating the path of auriferous deep leads.--W. Ayvazoglou.

## 9. NEW BOOKS

2143) Coast and Geodetic Survey, U. S. Alaska Magnetic Tables and Magnetic Charts for 1935. The publication may be obtained for 70 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C. Contents: (1) Introduction; (2) available data; (3) secular change data; (4) results of observations at repeat stations; (5) secular change tables; (6) contents of tables of results; (7) construction of magnetic charts; and (8) observed magnetic elements and corresponding values, January 1, 1935. Illustrations: (1) Lines of equal magnetic declination and of equal annual change; (2) lines of equal magnetic dip; (3) lines of equal magnetic horizontal intensity; (4) lines of equal magnetic vertical intensity.

(2144) Earthquake Research Institute, Bulletin, Tokyo Imperial University, Supplementary volume. Papers and Reports on the Tunami (abnormally high waves) of 1933 on the Sanriku Coast, Japan. Sold by Iwanami Shoten, Hitotubasi dori, Kanda, Tokyo. Price Yen 12.50. This volume includes the results of studies by various authors on the exceptionally high sea wave which swept the Sanriku Coast about half an hour after the earthquake of March 3, 1933. The contents comprise two parts. The first (271 pp.) contains the research papers and the second (250 pp.) the various reports from the afflicted regions and other data. A great number of maps and photographs is added. Most of the papers of the first part are written in English; those written in Japanese have abstracts in English. The second part is in Japanese, with a brief explanation (1-1/2 pp.) in English.

(2145) Linke, F. Meteorologisches Taschenbuch. (Meteorological Pocketbook), 2d ed. Leipzig, 1933. R.M. 16.80.- The book contains a contribution by H. Israel dealing with atmospheric electricity, conductivity, measurement of ions, radioactivity, etc. A meteorological glossary in German-English-French is added.

(2146) Maurain, Ch. Annales de l'Institut de Physique du Globe de l'Université de Paris et du Bureal Central de Magnétisme Terrestre, vol. 12, 1934, 86 pp. Paris, Les Press Universitaires de France, 49 Boulevard St. Michel. Contents of the book: (1) Magnetic Observations at the Observatory of Val-Joyeux during 1932, by L. Eblé; (2) Magnetic Observations at the Observatory of Nantes during 1932, by E. Tabesse; (3) Electric Field Observations at Val-Joyeux during 1932, by Ed. Salles; (4) Resumé of Seismological Observations at the Observatory of Parc Saint-Maur in 1932; by C. E. Brazier and L. Génaux; (5) Resumé of Meteorological Observations at the Observatory of Parc Saint-Maur in 1932; by C. E. Brazier; (6) Resumé of Actinometric Observations at the Observatory of Parc Saint-Maur in 1932, by C. E. Brazier; (7) On the Annual Variation in the Visibility of Alps at Great Distance and Its Relation to the Annual Variation in the Transparency of the Air; (8) on the Interval of Time between the Solar Phenomena and Magnetic Disturbances of the Earth, by Ch. Maurain; (9) Measurements of Magnetic Susceptibilities of Some Minerals and Basic Rocks, by P. Charczenko; (10) Diurnal and Semidiurnal Component of the Magnetic Declination and Disturbance, by Mr. and Mrs. H. Labrouste; (11) Principal Magnetic Perturbations in 1932.

(2147) National Research Council. Transactions of the American Geophysical Union, 15th Annual Meeting, April 26, 27, 28, 1934, Washington, D. C., and Berkeley, Calif., June 20, 21, 1934. The reports and papers presented at this meeting are given according to the sections into which the Union is divided. The contents of the book are as follows: Part I (pp. 1-258).

General Assembly (pp. 5-34) (1) Progress in Development of the United States Weather Service in Line with the Recommendations of the Science Advisory Board, by Willis Ray Gregg; (2) the Use of Aerological

Observations in Weather Forecasting, by H. C. Willett; (3) Complete Weather Maps of the Northern Hemisphere in Relation to Studies of Movements of Major Air Masses, by C. L. Mitchell; (4) Preliminary Report on Relationship between Temperatures in the United States and Precedent Pressures Outisde the United States, by R. Hanson Weightman; (5) Preliminary Report on the Upper-Air Work Undertaken in Canada During the Second International Polar Year, by J. Patterson; (6) Upper-Air Winds over Northern Alaska During the Polar Year, August 1932 to August 1933, by Loyd A. Stevens; (7) Mount Washington Contribution to the Second International Polar Year, by Salvatore Paglinca; (8) Apparatus to be carried on the National Geographic Society-Army Air Corps Stratosphere flights, by Albert W. Stevens; (9) A Short Report on the Fifth General Assembly of the International Union of Geodesy and Geophysics, Lisbon, Portugal, September 1933, by J. A. Fleming, H. D. Harradon, and W. D. Lambert; (10) resolutions adopted.

Section of Geodesy (pp. 35-56) (1) Plane Coordinate Systems for Individual States, by Oscar S. Adams; (2) Graduation and Calibration of Precision Circles, by Lewis V. Judson; (3) Longitude Determinations at Honolulu as Part of the International Program of 1933, by J. P. Lushene; (4) The Coastline and Islands of Hudson Bay--an Ideal Field for Geodetic Astronomical Work, by Noel J. Ogilvie; (5) Progress Report on the Absolute Determination of Gravity at Washington, by Paul R. Heyl; (6) Effect of Moon's Position on Observed Clock Corrections, by H. R. Morgan; (7) Progress of the Geodetic Work of the United States Coast and Geodetic Survey, April 1, 1933, to March 31, 1934, by C. L. Garner; (8) Recent Progress in Gravity Work, by C. H. Swick.

Section of Seismology (pp. 57-94) (1) Seismological Progress Report, by N. H. Heck; (2) Report of the Jesuit Seismological Association for 1933, by J. B. Macelwane; (3) Installation of Tiltmeters, by G. E. Merritt, (4) First-Order Leveling as an aid in Seismological Investigations in the United States, by Howard S. Rapplege; (5) The Earthquake of September 6, 1933, and Its Bearing on the Problem of the Deep Earthquake, by G. J. Brunner; (6) A Formula for Weather correction, by H. M. Rutherford; (7) New Values for Dilatational Wave-Velocities through the Earth, by Cornelius G. Dahm; (8) The Bay of Acapulco and Its Relation to the Earthquakes in the Southern Part of the Mexican Republic, by Pedro C. Sanchez; (9) Seismological Observations on Quarry Blasting, by Maurice Ewing, A. P. Crary, and J. M. Lohse.

Section of Meteorology (pp. 95-136) (1) Background for Fire-Weather Warnings, by E. B. Calvert; (2) Reorganization of Ocean Weather Records for New Applications, by W. F. McDonald; (3) Climatological Work Accomplished through Cooperation with the United States Civil Works Administration, by J. B. Kincer; (4) The Purpose of the Compilations of Aerological Data being Made under the Civil Works Administration Program of the Weather Bureau, by Louis P. Harrison; (5) Adjustment and Standardization of the Weather Bureau's River-Gage System with Public Works Funds, by M. W. Hayes; (6) Report on Sounding-Balloon Work Carried Out in the U. S. during the Polar Year, by J. C. Ballard; (7) Some Aspects of the Surface of Subsidence, by Jerome Namias; (8) Aerological Studies on Mount Washington, by S. P. Fergusson; (9) Differences between Temperatures, Humidities, and Winds on the White Mountains and in the Free Air, by Irving I. Schell; (10) The History of Mountain Meteorology in the United States and the Mount Washington Observatory, by Robert G. Stone; (11) Atmospheric Ionization near Ground during Thunderstorms, by G. R. Wait and A. G. McNish; (12) Lightning Discharges to Grounded Conductors, by J. C. Jensen.

Section of Terrestrial Magnetism and Electricity (pp. 137-186) (1) Lisbon Meeting of the International Association of Terrestrial Magnetism and Electricity, by J. A. Fleming; (2) The Study of Atmospheric Electricity in South Africa, by B. F. J. Schonland; (3) Atmospheric-Electric Observations at the College-Fairbanks Polar-Year Station, by K. L. Sherman; (4) Recent Researches on Fluctuations of Cosmic-Ray ionization, by James W. Broxon; (5) Studies of the Corpuscular Component of the Cosmic Radiation, by Thomas H. Johnson; (6) Radio and Earth-Potential Observations in New England, by G. W. Kenrick and P. M. Goldberg; (7) Audio-Frequency Atmospherics, by E. T. Burton and E. M. Boardman; (8) Further Studies of Radio Transmission in Geophysical Investigations, by Harlan T. Stetson; (9) Further Ozone-Measures and the Possible Connection of Ozone with Sunspot Cycle, by F. E. Fowle; (10) The Production of the Auroral Spectrum in the Laboratory, by Joseph Kaplan; (11) Aurorae and Earth Currents, by W. J. Rooney; (12) Preliminary Report on Auroral, Magnetic, and Earth-Current Observations at Chesterfield, Northwest Territories, Canada, by J. Patterson; (13) Some Facts about Secular Variation of the Earth's Magnetism, by Rosendo O. Sandoval; (14) Some Problems of Magnetic Surveys, by N. H. Keck; (15) Apparent Effect of Magnetic Activity upon Secular Variation of the Vertical Component of the Earth's Magnetic Field, by A. G. McNish; (16) Auto-radio - an Aid in Geologic Mapping, by Ernst Cloos; (17) Reports on Magnetic and Electric Work of Organizations in North America during 1933-34.

Section of Oceanography (pp. 187-232) (1) The Oceanographic Activities of the Hydrographic Office and the U. S. Navy during April 1933 to April 1934, by W. R. Gherardi; (2) The Oceanographic Work of the International Ice Patrol and Ice Observation Service Carried on by the Coast Guard in 1933, by R. M. Hoyle; (3) Oceanographic Activities of the U. S. Coast and Geodetic Survey, by R. R. Lukens; (4) Survace Temperatures on the New York to Cape Sao Roque Steamship Route, by Phil E. Church; (5) Temperature-Salinity Correlation with the Florida Current, by C. D. Iselin; (6) Recent Oceanographic Work in the Russian Arctic, by H. A. Bauer; (7) A preliminary Comparison of Monthly Weather with Ocean-Temperature Sequences in the Western Atlantic Region, by Charles F. Brooks and E. Monroe Harwood; (8) Report of the Committee on Oceanographic Activities of North America during April 1933 to April 1934, by T. Wayland Vaughan, chairman.

Section of Volcanology (pp. 233-258) (1) Rare Chemical Constituents of Amelia (Virginia) Pegmatite Dikes, and Their Mineral Sources, by Jewell J. Glass; (2) The Thermal Decomposition of Some Carbonate Minerals, by

Roger Clark Wells; (3) Geyser Basins and Igneous Emanations, by E. T. Allen; (4) Hydrothermal Metamorphism in Geyser Basins of Yellowstone Park, as Shown by Deep Drilling, by C. N. Fenner; (5) Volcanic Dust in Relation to Climate, by W. J. Humphreys; (6) The Role of Volatiles in the Formation of Virginia Titanium Deposits, by Clarence S. Ross; (7) Volcanic Activity in 1933, by E. G. Zies; (8) The Viscosity of Magmas (three articles by R. E. Gibson, N. L. Bowen, and Clarence S. Ross); (9) A Comparison Between Differentiation in Two Keweenawan Basalt Flows and that of the District in Which They Occur, by R. M. Broderick.

Part II (pp. 259-634) contains reports and papers presented by the Section of Hydrology.

Copies of the Transactions of the American Geophysical Union may be purchased by nonmembers of the Union at the following postpaid prices: Parts I and II, 634 pp., $2.75; Part I, pp. 1-258, $1.25, and Part II, pp. 259-634, $1.50. Reports and papers of single sections separately at $0.50 each. Section of Hydrology, $1.50. Orders with checks payable to American Geophysical Union, should be addressed to: The General Secretary, American Geophysical Union, 5241 Broad Branch Road, N. W., Washington, D. C., U. S. A.

2148) Steers, J. A. The Unstable Earth. E. P. Dutton and Co., New York, 1932, 341 pp., 66 maps and diagrams; Price $4.50. The constitution of the earth in accordance with seismological evidence and isostatic measurements is discussed. The following theories are considered: The planetesimal hypothesis of Chamberlin, the geosynclinal-orogen theory of Kober, the thermal-contraction theory revived by Jeffreys, the drift theory of Wegener, the theory of radioactivity of Joly, the hypothesis of sliding continents of Daly, and the convection-current theory of Holmes.

## 10. PATENTS

### (2149) OPTICAL TORSION BALANCE

Orley H. Truman, Houston, Tex., assignor to Standard
Oil Development Co.

nited States Patent 1963252 Issued June 19, 1934

This invention relates to an improvement upon previous forms of the ötvös torsion balance. The author claims: In combination, a short-period orsion balance, including a torsion wire and a weighted bar suspended by the ire and having a short period, a mirror movable with the bar, a source of ight, a compound microscope, and an optical system directing radiant energy rom the source to the mirror and directing light reflected from the mirror pon the microscope throughout the period of the bar.

Claims allowed - 2.

## (2150) METHOD OF AND APPARATUS FOR SEARCHING FOR ORES

Johann B. Ostermeier, Mering, near Augsburg, Germany,
assignor to Hauser & Co. G. M. b. H., Augsburg, Germany

United States Patent 1966105 Issued July 10, 1934

The present invention relates to a method of searching for ore deposits comprising the steps of connecting two electrodes of electrically equivalent material in a circuit by means of an intermediate electrolyte such as water, testing the ground by means of one of the electrodes and determining the potential difference created between said electrode and the second electrode when the first electrode touches an ore deposit.

Claims allowed - 6.

## (2151) PROCESS FOR THE RECONNAISSANCE OF THE GEOLOGICAL FORMATIONS, AND ESPECIALLY FOR THE STUDY OF POROUS STRATA ENCOUNTERED BY A BOREHOLE

Conrad Schlumberger, Paris, France, assignor to Société de Prospection
Électrique, Procédés Schlumberger, Paris, France, a corporation of France

United States Patent 1970342 Issued Aug. 14, 1934

This invention relates to the method of determining the degree of salinity of the water contained in a porous stratum encountered by a borehole, which consists in measuring in a mud of a given salinity filling the borehole the electromotive force of the concentration element constituted by the water in the stratum, the mud in the borehole and the surrounding rocks, and then repeating the said measurement with a mud of a different salinity in the borehole.

Claims allowed - 3.

## (2152) SEISMOGRAPH ODER ERSCHÜTTERUNGSMESSER

## (SEISMOGRAPH OR APPARATUS FOR MEASURING VIBRATIONS)

Askania Werke Aktien-Ges., vormals Centralwerkstatt Dessau und
Carl Bamberg-Friedenau, of Berlin-Friedenau.

German Patent 598786 Issued June 18, 1934

This invention relates to a seismograph provided with an auxiliary device for determining the natural behavior (Eigenverhalten) of the seismograph, especially its natural vibration, damping, etc. The oscillations excited in the seismograph by the auxiliary device are recorded simultaneously with those produced by the shock. The device is set in the pendulum weight.

Claims allowed - 9.

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G.A. No. 67 November 1934

DEPARTMENT OF THE INTERIOR

UNITED STATES BUREAU OF MINES
John W. Finch, Director

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# GEOPHYSICAL ABSTRACTS
MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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# 1. GRAVITATIONAL METHODS.

## (2153) BETRACHTUNGEN ÜBER EBENE PENDEL

## (CONSIDERATIONS CONCERNING FLAT PENDULUMS)

By Erich Hahnkamm

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934, pp. 235-9

Relations of the dependence between the period of oscillation of a pendulum and the change in the distance of the center of gravity are discussed for different values of the inertia-radius chosen according to special viewpoints. Exact values were obtained for the distance of the center of gravity in case of a given inertia-radius, for which the dependence of the time of oscillation from the change in the distance of the center of gravity is either a maximum or a minimum.--Author's abstract, translated by W. Ayvazoglou.

## (2154) AUSSENRAUM UND INNENRAUM

## (OUTER SPACE AND INNER SPACE)

By Robert Schwinner

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934, pp. 240-5

The article is supposed to settle the controversy concerning the reduction of the force of gravity. The translation of the author's abstract reads as follows:

All controversies concerning the correct reduction of gravity measurements, the undulations of the geoid, etc., become useless if the reductions are made with respect to two level surfaces lying one inside and the other outside of the earth; the reductions may be carried out in the first case according to Pray and in the second according to Faye; in both cases certain, but not very great, improvements in the corresponding proceeding must be made.

The more outward the smaller are the undulations of the level surfaces. From this a conclusion can be drawn that the sinking and deficient gravity on the one hand, and the elevation and exceeding gravity on the other must be considered together.--Author's abstract, translated by W. Ayvazoglou.

## (2155) BEMERKUNGEN ZU DEN GEOIDEN VON ACKERL UND HIRVONEN

## (REMARKS CONCERNING ACKERL'S AND HIRVONEN'S GEOIDS)

By K. Ledersteger

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934, pp. 246-51

The author makes an attempt to adjust the contradictions in the existing conceptions of the geoid by giving a new interpretation of the notion "mass-irregularity" (Massenunregelmässigkeit).--Author's abstract, translated by W. Ayvazoglou.

## 2. MAGNETIC METHODS

## (2156) REMARKS CONCERNING THE REDUCTION OF OBSERVATIONS MADE WITH SCHMIDT'S MAGNETIC BALANCE (IN POLISH)

By H. Orkisz

Institut de Géophysique et de Météorologie de l'Université de Lwow, vol. 6, Communication 68, 1933, pp. 41-80

Unexpected jumps in the values at the base points which caused errors in the results obtained were observed by the author during the field measurements with the Schmidt's magnetic vertical balance. In order to eliminate the errors all the values were recorded on a map and those showing great deviation from the normal values were summarized. It was proved that these desultory changes occurred mostly at night, thus the base values of single days were taken into account for compensating the errors.

The thermal coefficients of the balances used were determined frequently and it was established that the observations were to be limited by the hours from 8 a.m. to 6 p.m.--W. Ayvazoglou.

## (2157) ON ANOMALIES OF TERRESTRIAL MAGNETISM

By S. W. Visser

Proceedings K. Akademie, Amsterdam, vol. 37, no. 2, 1934, pp. 76-81

Based on the U. S. Navy magnetic map and applying the spherical system of coordinates, given by the magnetic poles, the axis connecting them, and the magnetic equator, the author draws attention to the relationship existing in the distribution of the earth's magnetic field and the values of the north-component, east-component, and vertical-component.--Dietsch's abstract in Geophysikalische Berichte, 1934, p. 97, translated by W. Ayvazoglou.

### (2158) THE DIURNAL INCIDENCE OF DISTURBANCE IN THE TERRESTRIAL MAGNETIC FIELD

By A. Crichton Mitchell

Transactions of the Royal Society of Edinburgh, vol. 57, part III, session 1932-33, 1934, pp. 617-32

The earlier attempts to prove the correlation between terrestrial and solar phenomena were based on the fact that the mean annual value of the absolute daily range in declination of horizontal force varied from year to year in much the same manner as the sunspots. But the relationship could not be traced with the same certainty from month to month, and with still smaller certainty from day to day. This, apart from a general lag in the magnetic phenomena behind the solar phenomena, was also due to the varying position of a sunspot on the visible surface of the sun and to the inadequacy of the daily range in declination as a measure of disturbance in the earth's field.

The possibility of a comparison between the results of the diurnal magnetic disturbances obtained at various observatories is examined. In the present paper the author attempts to estimate the activity from the hourly ranges of the force components as recorded at a single observatory. Daily magnetograms from Eskdalemuir Observatory from 1914-25 were used. Ten tables and one figure showing the diurnal variation of activity complete the article.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (2159) ZUR PHOTOGRAPHISCHEN REGISTRIERUNG VON STATIONS-SEISMOMETERN

### (PHOTOGRAPHIC REGISTRATION OF STATION SEISMOMETERS)

By O. Meisser

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934, pp. 259-65

The author describes a drum recorder driven by a motor and discusses the results of an extensive investigation.--W. Ayvazoglou.

### (2160) EIN HORIZONTALSEISMOMETER FÜR DIE AUFZEICHNUNG VON STARKEN ORTS-UND NAHBEBEN

### (A HORIZONTAL SEISMOMETER FOR REGISTERING STRONG LOCAL AND NEAR-DISTANT EARTHQUAKES)

By N. A. Critikos

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934, pp. 265-9

Critikos gives the description of a seismograph constructed by him which in his opinion is more suitable for registering strong local and ear-distant earthquakes than the seismographs used ordinarily, as it meets he following demands: it is strong, has a pendulum with short natural eriod, a simple kind of damping, and is provided with mechanical registra-ion.

The seismograph worked very satisfactorily during the strong near-distant arthquake in Chalkidiki on September 26, 1932.--W. Ayvazoglou.

### (2161) DIE BEDEUTUNG DER UNSTETIGKEITEN IM VERLAUF DER SCHALLGESCHWINDIGKEIT MIT DER HÖHE FÜR DIE NORMALE UND ANORMALE SCHALLFORTPFLANZUNG

### (THE IMPORTANCE OF DISCONTINUITIES MET BY THE COURSE OF THE VELOCITY OF SOUND AT DIFFERENT ALTITUDES FOR THE NORMAL AND ABNORMAL PROPAGATION OF SOUND)

By B. Sandmann

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934,
pp. 269-77

The "acoustical layer of reversal" (akustische Umkehrschicht) is men-ioned by the author as a special factor, in addition to other essential orms of discontinuities which affect propagation of the sound at different ltitudes during the course of the velocity of sound. The existing resem-lance to the phenomenon of "Uller's restricted (guided) wave" (Ullersche eführte Welle) is noticed. Many phenomena appearing during propagation of he sound in the atmosphere are caused by discontinuities in the same way as he abnormal propagation of the sound produced by the "acoustical layer of eversal".

According to a series of the results of observations it is proved that he law of refraction cannot be applied, under certain conditions, for the epresentation of the course of the sound and that the phenomena of bending ust be taken into consideration also.--Author's abstract, translated by . Ayvazoglou.

### (2162) EISTIEFENMESSUNGEN AM RHONEGLETSCHER IM JULI UND AUGUST 1931

### (ICE-DEPTH MEASUREMENTS ON THE RHONE GLACIER IN JULY AND AUGUST 1931)

By W. Jost

Verhandlungen der schweizerischen naturforscher Gesellschaft,
114 Jahresvers., Altdorf, 1933; section of Geophysics, Meteorology, and
Astronomy, 1933, pp. 341-2

Brief description of seismic method applied to the ice-depth measurements nd some results of investigations carried out are given.--W. Ayvazoglou.

## (2163) SULLA ESTENSIONE DEL METODO DEL VENTAGLIO SISMICO NELLA PROSPEZIONE DEL SOTTOSUOLO

(ON THE EXTENSION OF THE SEISMIC "FAN METHOD" FOR PROSPECTING THE SUBSOIL)

By A. Belluigi

Bollettino della Societa Sismologica Italiana, Rome,
vol. 32, no. 1/2, 1934, pp. 10-6

In this note Belluigi briefly examines the method of seismic prospecting described by J. H. Jones in his paper, A Seismic Method of Mapping Anticlinal Structures (World Petroleum Congress, July 19 - 25, 1933, London), which was successfully applied by Jones in Persia.--W. Ayvazoglou.

## (2164) VERWENDUNG DER RESONANZMETHODE BEI SEISMISCHEN UNTERSUCHUNGEN

(THE USE OF THE RESONANCE METHOD IN SEISMIC INVESTIGATIONS)

By G. Angenheister

Union Géodesique et Géophysique Internationale, Association de
Séismologie, Publications du Bureau Central,
ser. A, no. 10, 1934, 9 pp.

In this report on the work of the Geophysical Institute of Gottingen, delivered by Angenheister at the fifth general assembly at Lisbon in September 1933, the author discussed the application of the resonnance method for investigating the oscillations of various objects, such as seismographs, buildings, ground. The oscillations were produced artificially, and the proper period, increase, and degree of dampening of seismographs, buildings, and ground were determined.

The oscillations were produced by methods described by Köhler (Zeitschrift für Geophysik, vol. 8, 1932, pp. 74-84, and 461-467) and Ramspeck (Zeitschrift für Geophysik, vol. 8, 1932, pp. 71-74, and vol. 9, 1933, pp. 342-350).--W. Ayvazoglou.

## (2165) SEISMIC WAVES

By R. Einaudi

R. Accademia Nazionale dei Lincei, Rome, vol. 19, January 1934, pp. 33-7

The principal phase of seismic waves comprises a first principal phase composed of horizontal-transversal vibrations (Love waves), and a second principal phase composed of horizontal-longitudinal and vertical vibrations (Rayleigh waves). The most general types of waves that start directly from the hypocenter and are compatible with the conditions of zero force at the earth's surface are investigated here and found to be waves with horizontal-transversal vibrations, like the waves of the first principal phase.--Abstract from Science Abstracts, vol. 37, no. 439, July 25, 1934, signed by A. J. McC.

## (2166) EARTHQUAKE NOTES

Edited by R. R. Bodle

Eastern Section Seismological Society of America, Washington, D. C.,
vol. 6, no. 1/2, 1934, 22 pp.

Abstracts of the following papers presented at the New York meeting of the Society, held from April 30 to May 1, 1934, are given: (1) Deep-Focus Earthquakes and Allied Problems, by V. C. Stechschulte; (2) Communication Regarding Huancayo Seismograph Station, by J. A. Fleming; (3) The Significance of Barometric Oscillations in the Propagation of Microseisms, with Special Reference to Ground Unrest During the Years 1929-31, Inclusive, at Sitka, Alaska, by Donald C. Bradford; (4) A Note on Two Microseismic Storms of the Past Year, by F. W. Sohon; (5) Earthquakes of 1933-1934, by Joseph Lynch; (6) World Distribution of Earthquake Epicenters and Seismic Sea Waves; by N. H. Heck; (7) Construction of an Azimuthal-Equidistant Projection for Seismograph-Station Uses, by J. Howells; (8) Modern Earthquake Design of Structures, by Jacob G. Creskoff; (9) Research in Engineering Seismology at Massachusetts Institute of Technology, by Arthur C. Ruge; (10) A Practical Method of Integrating Acceleration Curves, by Frank Neumann; (11) Earthquakes Instrumentally Recorded in Artesian Wells, by R. M. Leggette and G. H. Taylor; (12) An Application of Vacuum-Tube Amplification to Indicators and Records, by Roswell W. Gilbert; (13) A New Seismograph, by A. J. Weed; (14) The Great Indian Earthquake of January 15, 1934, by V. C. Stechschulte; (15) An Inverse Boundary Value Problem in Seismology, by Chaim L. Pekeris; (16) The Extraordinarily Deep Earthquake of May 26, 1932, by G. J. Brunner; (17) A Method for the Simultaneous Determination of Focal Depth, Epicentral Distance, and Focal Time from the Seismograms of a Single Station by Means of a Graphic Chart, by G. J. Brunner; (18) On the Location of Deep-Focus Earthquakes, by A. Blake; (19) Experiments on Emergence Angle and Propagation Paths, by Maurice Ewing and A. P. Crary; (20) A Further Note on the Interpretation of Travel-Time Curves, by Frank Neuman; (21) A Precise Determination of the Depth of the Earth's Core and of P Wave Paths in the Mantle, by Cornelius G. Dahm; (22) A Practical Station Map for Azimuth and Distance with Graphic Rules for Latitude and Longitude, by R. J. Buckly.--W. Ayvazoglou.

## (2167) THE TRANSMISSION OF RAYLEIGH WAVES IN A HETEROGENEOUS MEDIUM

By R. Stoneley

Monthly Notices of the Royal Astronomical Society, London, Geophysical
Supplement, vol. 3, no. 6, 1934, pp. 222-32

The problem of Rayleigh waves in a uniform surface layer has been treated by several authors (Love, Sezawa, Stoneley). A single-layer model is inadequate for the discussion of surface waves in a continent; even a two-layer model does not bring out the behavior of the shorter waves. The work for obtaining the Rayleigh-wave equation for a two-layer model is extremely laborious, and it is natural to attempt to represent the distribution of elastic properties, which is most probably discontinuous, by a continuous distribution. For Rayleigh waves two cases are, according to the author, fairly easily manageable, a solid of constant density with its rigidity depending linearly on the depth, and one constant density with a "small" variation in rigidity. A mathematical discussion of the first case is given in this paper.--W. Ayvazoglu.

## (2168) FURTHER INVESTIGATIONS OF THE EFFECT OF GEOLOGICAL STRUCTURE UPON MICROSEISMIC DISTURBANCE

By A. W. Lee

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, no. 6, 1934, pp. 238-52

In this article Lee continues his investigations of Rayleigh waves in a medium covered with a superficial layer (see Geoph. Abs. 44, p. 660). Numerical results are given for layers of any thickness. The computations include two cases (granite on tachylyte, and clay on granite) representing small and large differences between the properties of the materials in the layer and below.--W. Ayvazoglou.

## 4. ELECTRICAL METHODS

## (2169) SUR LA MESURE DU CHAMP ÉLECTRIQUE TERRESTRE ET DE SES VARIATIONS

(CONCERNING THE MEASUREMENT OF TERRESTRIAL ELECTRIC FIELD AND ITS VARIATIONS)

By G. Grenet

Comptes rendus de l'Académie des Sciences à Paris, vol. 198, no. 10, 1934, pp. 967-8

The author gives a brief direction for measuring rapidly changing electrical fields. Formulas are derived.--W. Ayvazoglou.

## (2170) MUTUAL IMPEDANCE OF GROUNDED WIRES LYING ON THE SURFACE OF THE EARTH WHEN THE CONDUCTIVITY VARIES EXPONENTIALLY WITH DEPTH

By Marion C. Gray

Physics, Lancaster, vol. 5, no. 1, 1934, pp. 35-37

This paper presents formulas for the mutual impedance of any insulated wires of negligible diameter lying on the surface of the earth and grounded at their end points, on the assumption that the conductivity of the earth varies exponentially with depth. Various special cases are briefly discussed.--Author's abstract.

## (2171) LOCATING WATER SOURCES IN OIL WELLS BY ELECTRICAL METHOD

By Brad Mills

Oil Weekly, Houston, vol. 74, no. 12, 1934, pp. 24-6

The principle and method of operation for locating water sources in oil wells are described. The method employs the principle of adaptation of electrical resistance measurements to locating water entering oil wells.--W. Ayvazoglou.

## (2172) INDIVIDUAZIONE E DETERMINAZIONE DI DICCHI E COLATE BASALTICHE SEPOLTE, COL METODO GEOELETTRICO WENNER

## (INDIVIDUALIZATION AND DETERMINATION OF BURIED BASALTIC DYKES AND INFILTRATIONS BY THE WENNER GEO-ELECTRIC METHOD)

By A. Belluigi

Reale Accademia Nazionale dei Lincei, Rome, vol. 19, no. 5, 1934,
pp. 337-40

The possibility of determining buried basaltic dykes and infiltrations by the Wenner geo-electric methods is examined on a few examples.--W. Ayvazoglou.

## (2173) SU DI UN TIPO PARTICOLARE DI ANOMALIA DI RESISTIVITA APPARENTE $\mathcal{S}_s$ NEI SONDAGGI ELETTRICI

## (ON A PARTICULAR TYPE OF THE ANOMALY OF THE APPARENT RESISTIVITY $\mathcal{S}_s$ IN ELECTRICAL PROSPECTING)

By A. Belluigi and L. Lombardi

Atti della Pontificia Accademia della Scienze Nuovi Lincei, Rome, vol. 87,
session 5, Apr. 15, 1934, pp. 350-3

The possibility of application the earth resistivity method for a series of strata overlaying one another is discussed.--W. Ayvazoglou.

## (2174) SUL PROCEDIMENTO DI CAROTAGGIO ELETTRICO

## (ON THE PROGRESS IN ELECTRICAL CORING)

By A. Belluigi

Bollettino del Comitato per la Geodesia e la Geofisica del Consiglio
Nazionale delle Ricerche, ser. II, vol. 4, no. 1/2, July 1934, pp. 1-8

The author discusses the possibility, merits, and difficulties of electrical coring. His application in prospecting for minerals is examined.--W. Ayvazoglou.

## (2175) DISTRIBUZIONE NORMALE DEI PIANI DI POLARIZZAZIONE ELETTROMAGNETICA IN UN SUOLO ELETTRIZZATO

## (NORMAL DISTRIBUTION OF THE ELECTROMAGNETIC POLARIZATION PLANES IN AN ELECTRICAL FIELD)

By A. Belluigi

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 4, 1934,
pp. 395-9

The author gives the vectorial expressions for a linear, a circular, and an elliptical polarized electrical field and investigates the distribution of the sections of the polarization planes with the horizontal plane for the case of a homogeneous and isotropic subsoil. This distribution may be used by the comparison with known and partly simplified cases. The author shows the advantage obtained by this method and expects to take over this question again in the near future.--Author's abstract.

## (2176) ÜBER DEN EFFECT DER ANISTROPIE BEI GLEICHSTROMMESSUNGEN

## (ON THE EFFECT OF ANISTROPY IN DIRECT CURRENT MEASUREMENTS)

By A. Belluigi

Beiträge zur angewandten Geophysik, Leipzig, vol. 4, no. 4, 1934,
pp. 400-6

The author makes a critical examination of a series of articles written by various authors on the effect of electrical measurements in anisotropic media. He concludes that in making electrical measurements, the correction for the anisotropy can generally be neglected in practice, except in the unusual case when the sending electrode and the measuring electrode are very close one to another.--W. Ayvazoglou.

## (2177) AURORAE AND EARTH-CURRENTS

By W. J. Rooney

Terrestrial Magn. and Atmosph. Electricity, Baltimore,
vol. 39, no. 2, 1934, pp. 103-11

A comparison of auroral observations and earth-current records from the College-Fairbanks Station during the International Polar Year 1932-33 shows considerable agreement between the aurorae and disturbances in the earth-current records. Coefficient of linear correlation from 0.71 to 0.76 were obtained from the records for 80 clear nights. Effects associated with brilliant isolated auroral displays at College are readily detected in the earth-current records at Tucson, Ariz., and in exceptional cases, in records obtained as far south as Huancayo, Peru. Oscillatory disturbances in the earth-current records and moving types of aurora, respectively, seem to show the highest degree of correlation. These results are at variance with comparisons of magnetic and auroral records which indicate a lack of relationship between the two phenomena.--Author's abstract.

## 5. RADIOACTIVE METHODS

### (2178) AUTO-RADIO ALS HILFSMITTEL GEOLOGISCHER KARTIERUNG

### (AUTO-RADIO AN AID FOR TRACING GEOLOGIC MAPS)

By Ernst Cloos

Zeitschrift für Geophysik, Braunschweig, vol. 10, no. 5/6, 1934,
pp. 252-8

Systematic observations of the geographic distribution of the receiving-disturbances observed in an automobile radio receiver proved that at certain stations the receiving is considerably disturbed by underground conditions. The receiving is often lacking above steep faults and borders of rocks. Measurements in such regions may result in valuable indications for determining geological structures on the one hand and on the other hand a favorable installation of the receiving apparatus becomes easier. Small changes in an ordinary automobile radio are sufficient for obtaining qualitative and quantitative determinations of the disturbances. Contents of the article: 1, Introduction; 2, Apparatus; 3, Method: (a) Method of observation; (b) disturbances; (c) reaction of various stations; (d) causes of disturbance; technical constructions, stationary, movable; variations in sending; natural sources of disturbance, cosmic, topographic; 4, Results: The Geological component; dip; 5, Examples: Riderwood fault; borders between quartzite and gneiss, marble and gneiss, etc.; gabbro contacts; large faults and fault-zones; measurements of the intensity of the field; 6, Prospect and program: apparatus; method; physical considerations; 7, Conclusion.--Author's abstract, translated by W. Ayvazoglou.

### (2179) SUR LA RADIOACTIVITÉ DES SOURCES MINÉRALES DE GRÈCE

### (ON THE RADIOACTIVITY OF MINERAL SPRINGS IN GREECE)

By Michel Pertessis

Comptes rendus de l'Académie des Sciences, Paris, vol. 198, no. 11, 1934,
pp. 1053-5

The radioactivity of almost all mineral springs in Greece was investigated since 1923. Engler-Sieveking fontactometer was used. Numerical results for a great number of springs are given.--W. Ayvazoglou.

## (2180) HIGH CONCENTRATIONS OF RADIUM AND MESOTHORIUM I IN NATURE AND REGULARITY OF THEIR MIGRATION

By J. D. Kurbatov

Journal of Physical Chemistry, Baltimore, vol. 38, no. 4, 1934, pp. 521-32

1. High concentrations of radium and mesothorium I in natural waters are described. The highest concentrations of these elements, which amount to $1.8 \times 10^{-8}$ g. of radium and $2 \times 10^{-2}$ g. of mesothorium I (Th-units) per liter of water, have been found in salt water associated with petroleum beds.

2. A method of simultaneous determination of radium, mesothorium I, thorium X, and radiothorium is described.

3. It has been found that the presence of sulphate ions does not affect this high concentration of radium or mesothorium I in natural water.

4. The amount of radiothorium in natural active water was found to be less than that required for radioactive equilibrium with the mesothorium I which was present in this water.

5. A study of the process of migration of radium in nature has shown that radium and mesothorium I are easily transferred from eruptive rocks to mineral waters and from mineral waters to sediments in such a manner that the concentration of radium in sediments is increased a thousand times.

6. Precipitation of radium and mesothorium from water is associated with manganese and ferric hydroxides in sediments.--Author's abstract.

## (2181) A DETERMINATION OF THE RADIUM CONTENT OF SOME SOUTH AFRICAN GRANITES

By M. N. S. Jmmelman

Philosophical Magazine, London, vol. 17, no. 115, 1934, pp. 1038-47

Describes new form of furnace which the author used for determining radium content of granites.

The arrangement of the apparatus as used in the experiments is shown in a figure. A typical experiment is described. The values obtained from the investigation of samples of Nama granites are given in a table.--W. Ayvazoglou.

## (2182) THE RADIUM CONTENT OF SOME CONNATE WATERS

By Holbrook G. Botset

Physics, Lancaster, vol. 5, no. 9, 1934, pp. 276-80

A method is described for measuring the radium content of natural waters. The method is shown to be accurate to within a few percent for concentrations as low as 100 x $10^{-12}$g. Ra per liter. Results are given of measurements of several connate waters from Mid-Continent oil fields. A correlation between radium and calcium content of the waters is indicated. Samples taken from the same wells over a period of several months indicate that the radium concentration is a definite property of a connate water.--Author's abstract.

## 6. GEOTHERMAL METHODS

### (2183) THE THERMOCOUPLE PROVES USEFUL ON A GEOPHYSICAL SURVEY

By J. N. A. van den Bouwhuijsen

Engineering and Mining Journal, New York, vol. 135, no. 8, 1934, pp. 342-4

The flow of heat from the earth's center toward a fixed point close to its surface depends on the heat conductivity of the rock formations between the center and the point and on the thickness of the different layers. Therefore, according to the author, a shift in the location and a variation in the thickness of the layers would result in differences in temperature when measured across the structure at the same depth.

Thus the horizontal gradient of the temperature in a layer close to the surface should supply some evidence as to the structure of the underlying formations. To prevent the influence of the variations of the temperature it is sufficient to measure the temperature at a depth of 1.5 m. Holes drilled for the measurements were about $1\frac{1}{2}$ inches in diameter.

The experiments were made with thermocouples of special construction, connected to a galvanometer of high sensitivity and sturdy enough to stand transportation in the field.

To determine the value of the new method (thermoelectric method) the author made experiments over two profiles which had previously been well-determined by torsion-balance work by Mekel, near Winterswijk, Holland. The results checked most remarkably those with the gravity method.

Plans showing the results of temperature measurements and of torsion balance survey are given.

Approximately $200 would buy all of the instruments. The reading requires only a few minutes and the crew consists of only 2 men, 1 to drill the holes and 1 observer to take the readings.--W. Ayvazoglou.

## 7. UNCLASSIFIED METHODS

### (2184) GEOPHYSICS

Editorial note

Mining and Industrial Magazine of South Africa, Johannesburg, vol. 18, no. 12, 1934, pp. 541-2

This note refers to the article appeared in the first printed issue of The Fulcrum. The article consists of 2 parts: Part I - Historical; Part II - Principles and Practice. In part I especially is mentioned the Report of the Imperial Geophysical Experimental Survey published in 1931 under the title "Principles and Practice of Geophysical Prospecting", by A. B. Broughton Edge and T. H. Laby (see Geophys. Abs. 30, p. 207).

Part II deals with the principles and practice concerning the following subjects: Terrestrial magnetism and electricity, gravitation, seismology, radioactivity, artificial earth currents, magnetism and electromagnetic waves, thermal investigations.--W. Ayvazoglou.

## 8. GEOLOGY

### (2185) FLUID MECHANICS OF SALT DOMES

By L. L. Nettleton

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 18, no. 9, 1934, pp. 1175-204

A fluid mechanical hypothesis for the formation of salt domes is presented, for which the basic assumptions are: (1) That the prime motive force for the formation of domes is the density difference between the salt and the surrounding sediments; and (2) that both the salt and the surrounding sediments behave as highly viscous liquids and slowly flow through long geological time.

A simple analysis of the behavior to be expected under the above assumptions shows that a "peripheral sink" will be formed. This will cut off the supply of salt flowing into the dome but this cut-off does not depend on the salt being actually pinched off by the meeting of rocks originally above and below the salt. It may occur at any stage in the development of the peripheral sink, depending on the strength or viscosity of the overburden.

Expressions for the volume relations and relative dimensions of the dome are given in terms of the thickness of the salt and radius of the peripheral sink. Several numerical examples are tabulated.

A series of qualitative experiments show the flow, under a wide range of relative viscosities of two liquids of different densities with the lighter liquid originally below the heavier liquid. The experiments illustrate the odifications of the flow produced by the peripheral sink and the manner in hich the cut-off by the peripheral sink is controlled by the relative visosities of the two liquids involved.

A series of diagrams is presented to show the hypothetical history of he formation of domes by fluid flow with the further assumption that the low takes place in a time comparable with the time of deposition of the overying sediments. From these diagrams it is evident that some of the most triking geological features of salt domes, such as overhang, rim synclines, nd down-faulted blocks next to the salt are natural consequences of the luid hypothesis. Also the wide range in form and volume of salt domes in he Gulf coast and in the interior of Texas and Louisiana, as indicated by he wide range in gravity effects which they produce, can be reasonably ccounted for by the fluid hypothesis outlined.--Author's abstract.

## 9. NEW BOOKS

2186) Cornish, Dr. Vaughan, with additional notes by Dr. Harold Jeffreys. Ocean Waves and Kindred Geophysical Phenomena. 164 pp., 26 plates. Cambridge: at the University Press, 1934. Price 10 s. net. The book provides mathematicians with numerical data for the development of the theory of water waves, and to enlist their interest in the progressive undulations of granular material. A great part of the volume is taken up with a consideration of waves in sand and snow, formed and propelled by wind and current.

2187) Stetson, Harlan True. Earth, Radio, and the Stars. McGraw-Hill Book Company, New York, 1934, 330 pp. 88 illustrations. Price $3.00. A synthesis of what is known about the earth and life upon the earth and how both are affected by the cosmic environment is given. Chapter headings: 1, The Twin-Planet; 2, The Wandering Poles; 3, Does the Moon Change the Latitude?; 4, Ocean tides; 5, Earth tides; 6, Variation in Longitude; 7, The Earth from the Inside; 8, The Sun's Effects on Human Affairs; 9, Sunspots and the Earth's Magnetism; 10, Sunspots and Radio Reception; 11, The Sun and the Ionized Layer; 12, Transatlantic Radio Transmission; 13, The Moon and Radio; 14, Solar Eclipses and Radio; 15, Meteors and Radio; 16, Radio and the Stars; 17, Illuminations of the Night Sky; 18, Cosmic Clouds; 19, Cosmic Rays; 20, Cosmology.

2188) Uren, Lester C. Petroleum Production Engineering. 2d edition. vol. 1, Development. McGraw-Hill Book Co., New York, 1934, 531 pp. Price $5.00. Geophysical prospecting is discussed in the chapter "Geophysical exploration instruments and methods (gravimetric methods, seismic methods, use of the geophone in gathering subsurface data in wells, magnetic methods, electrical methods, and measurements of terrestrial radioactivity).

2189) Wilsdon, B. H. and Bose, N. K. A Gravitational Survey of the Suballuvium of the Jhelum-Chenabravi Doabs, and Its Application to Problems of Waterlogging. Punjab Irrigation Research Institute, Calcutta. Research publication vol. 6, no. 1, February 1934, 44 pp., 12 figs., 4 plates. Price: Rs. 5 or 7 s. 6d. The survey described in this paper was begun in 1927-28 to gain knowledge of the depth of the alluvial soil in certain tracts of Punjab. The book consists of two parts: Part I: Discussion of Objects and Results, by B. H. Wilsdon, and Part II: Discussion of the Theory of Torsion Balance and the Methods of Procedure, by N. K. Bose, and eight appendixes: (1) Terrain effect; (2) extra effect; (3) Cartographical Effect; (4) Normal Effect; (5) Density Determination of Rock Samples; (6) Gradient and H. D. T. Chaj Doab; (7) Gradient and H. D. T. Salt Range Area; and (8) Gradient and H. D. T. Rechna Doab.

## 10. PATENTS

### (2190) TORSION BALANCE

The Standard Oil Development Co., New York City, N. Y.,
assignee of Ludwig W. Blau, Houston, Tex.

Canadian Patent 341532 Issued May 8, 1934

This invention relates to a combination with the balance beam of a torsion balance of the type used in gravitational measurements of a support, a suspension mirror, a filament suspending the mirror from the balance beam, a second filament suspending the mirror from said support, whereby the mirror is oscillatory rotated by the balance beam when said beam is rotated.

Claims allowed - 3.

### (2191) ELECTRICAL PROSPECTING METHOD

The Swedish American Prospecting Co., New York City, assignee of
Hans T. F. Lundberg and Folke H. Kihlstedt, coinventors,
both of Massapequa, N. Y.

Canadian Patent 343635 Issued July 31, 1934

This invention relates to a method of electrical prospecting. The steps comprise flooding a profile of a tract under investigation with current supplied from one side of the profile, moving a ground current receiving network across the profile and taking readings from point to point; then flooding the profile with current supplied from the opposite side of the profile, and again moving the ground current receiving network across the profile and taking readings from point to point.

Claims allowed - 6.

## (2192) SEISMOGRAPH WITH ELASTICALLY MOUNTED MOVABLE MASS

G. A. Gamburzeff

ussian Patent 107489 Issued July 1934

This invention relates to a seismograph provided with an arrangement in hich a filament is fixed in front of the opening of a case inside of which he movable mass is mounted elastically. The recording of the oscillations f the ground is achieved by means of the change in the resistance of the ilament owing to its cooling by the air forced out of the opening by the ass.

Claims allowed - 1.

## (2193) APPARATUS FOR MEASURING THE DISTRIBUTION OF THE POTENTIAL IN THE GROUND IN PROSPECTING FOR ORE

E. S. Livshits

ussian Patent 92192 Issued July 1933

This invention relates to an arrangement in which a transformer is used or measuring the potential drop between the probe-electrode created during he flow of the alternating current from the generator through the probes and he ground; the primary winding of the transformer is connected to the enerator circuit parallel to the resistance and the secondary winding is conected to the potentiometer from the movable contacts of which the voltage ecessary for compensating the measured potential drop is taken.

Claims allowed - 3.

## (2194) GRAVITATIONAL VARIOMETER

D. G. Uspenski

ussian Patent 99270 Issued August 1933

This invention relates to a gravitational variometer with two weights ixed at different heights and having short period of proper oscillations. o make the apparatus insensitive to curvatures the masses of the weights are istributed with respect to the axis of rotation and the vertical plane passng through the axis of the beam in such a way that the difference between the oment of the inertia of the system and the doubled square moment with regard o the plane is about equal to zero.

Claims allowed - 1.

## (2195) INDUCTION METHOD OF PROSPECTING FOR ORE

K. K. Korovin

Russian Patent 97459 Issued November 1933

This invention relates to the induction method of prospecting for ore in which the same routes are made twice: once by working with short waves and the second time by working with long waves. The purpose is that in case of the existence of ore the maximum angular displacements of the receiving frame coincide in both cases, that is in working with short waves and long waves.

Claims allowed - 1.

## (2196) MAGNETIC METHOD OF PROSPECTING

P. P. Kuznetzov

Russian Patent 113853 Issued January 1934

This invention is characterized by the method in which the horizontal component of the field produced by the ore deposit is determined by directing the compensation magnet along the normal magnetic meridian as known from the orientation of the laying out of the network, then the compensation magnet is adjusted to the reading corresponding to the compensation of the horizontal component of the normal earth's field; after this the direction of the horizontal component is determined from the position of the magnetic system of the instrument which automatically comes to rest in the direction of the effect of the deposit; for the determination of the value of the horizontal component the compensation magnet is adjusted to the direction found for this component and the magnet is then moved until the magnetic system comes to rest in the direction of the normal meridian, that is, to the direction which the compensation magnet had occupied when the direction of the horizontal component was searched; the value of the horizontal component is determined from the displacement of the magnet.

Claims allowed - 1.

## (2197) APPARATUS FOR GEOPHYSICAL PROSPECTING BY MEANS OF ALTERNATING CURRENT

A. M. Alpin

Russian Patent 127758 Issued February 1934

This invention relates to an apparatus for geophysical prospecting with the aid of which the distortion of the field between the grounded electrodes fed by alternating current is removed. The apparatus consists of a metallic frame with a closed circuit which is not connected either to the source of the current or to the measuring instruments and is buried into the ground between the electrodes.

Claims allowed - 2.

## (2198) MAGNETIC VARIOMETER

A. M. Ertel

ussian Patent 126221 Issued February 1934

This invention relates to a magnetic variometer in which the effect of he magnetic field is increased by using iron rods fixed at both sides of the ovable magnetic system of the variometer, the direction of the axis of the ods being along one straight line.

Claims allowed - 2.

## (2199) PROCÉDÉ PERMETTANT DE DÉCELER LA PRÉSENCE DE CERTAINS CORPS DANS LE SOL OU AILLEURS, ET D'ÉTUDIER LEURS PROPRIÉTÉS

(METHOD FOR DISCLOSING THE PRESENCE OF CERTAIN BODIES IN THE GROUND OR ELSEWHERE AND FOR STUDYING THEIR PROPERTIES)

Louis Turenne of France (Seine)

rench Patent 42464/704353 Issued May 2, 1933

This is an additional patent to no. 704353, issued May 19, 1931 (see eophys. Abs. 42, p. 625).

The improvements to which this invention relates consist of combining the etector having a V-form, with a magnetic needle placed at one of its branches; y changing the direction of the point of the needle with respect to the deector more characteristics of the body under investigation may be obtained.

Claims allowed - 4.

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A. No. 68 DEPARTMENT OF THE INTERIOR December 1934

UNITED STATES BUREAU OF MINES
John W. Finch, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

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## ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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## 1. GRAVITATIONAL METHODS

### (2200) ANOMALIES DE LA GRAVITÉ DANS LE SUD DE L'INDOCHINE

### (GRAVITY ANOMALIES IN THE SOUTH OF INDO-CHINA)

By Pierre Lejay

Comptes rendus de l'Académie des Sciences, Paris, vol. 199,
no. 9, Aug. 27, 1934, pp. 521-3

The author divides South Indo-China, from gravimetrical viewpoint, into three main zones, Central, Western, and Eastern. A map of Bouguer's anomalies by which the action of deep layers is approximately represented is given. According to this map the elevated parts of all the three zones are composed of masses the density of which underground is very small. But, while in North China the action of these compensating masses is felt at great distance, here the action is distinctly local. According to the author, it is not possible to connect this fact with the inverse influence of oceanic compensations, taking into consideration the comparatively small depths of the southern Chinese Sea and of the Gulf of Siam.--W. Ayvazoglou.

### (2201) GRAVITY OBSERVATIONS IN MALAYA, THE DUTCH INDIES, CAMBODIA, AND COCHIN CHINA

By Pierre Lejay

Comptes rendus de l'Académie des Sciences, Paris, vol. 199, no. 5,
July 30, 1934

Observations were made to verify the new calibration of Holweck-Lejay pendulum no. 42. Measurements at several points determined by Vening-Meincsz were in close agreement.

Some new determinations were made in Cambodia and Cochin China.--W. Ayvazoglou.

### (2202) GRAVITY MEASUREMENTS (in Polish)

By Anton Kwiatkowski

Bulletin de la Société Géophysique de Varsovie, Warsaw,
no. 7/8, 1933, pp. 6-29

After the discussion of the purpose and importance of gravitational measurements, the author gives the methods of measuring gravity and concludes by mentioning briefly the work in Poland.--W. Ayvazoglou.

### (2203) SHORT-PERIOD TORSION BALANCE

American Askania Corporation

Instruments, Pittsburgh, vol. 7, no. 8, 1934, p. 171

This new balance consists mainly of two inclined balance beams, which n their respective tubes have been mounted to a central cast-aluminum asing containing the optical equipment of the instrument. The period of bservation is only 20 minutes. The height of the new balance is about 4 eet, and the weight is 85 pounds for full automatic operation and 55 pounds or semiautomatic. Sensitivity is slightly lower than that of the Askania -bar torsion balance.--W. Ayvazoglou.

### (2204) BRIEF INFORMATION ON THE RESULTS OF GRAVIMETRICAL WORK ON THE NORTH-CAUCASIAN OUTSKIRTS OF THE DON-BASIN (in Russian)

By Borisenko

Geologia na fronte industrializatsii, Novocherkask (Caucasus),
nos. 1-3, 1934, pp. 19-22

The purpose of the gravimetrical work from 1929 to 1933 on the outskirts f the Great Don Basin consisted of finding new coal-bearing deposits extending toward the North Caucasus. Thirty-three pendulum observations and 3,971 bservations with the gravitational variometer were made during this period. t was established that the extension of the deposit coincides with the diection of the main deposit of the Don Basin. The results of the work are ummarized briefly for each year. The average cost of a pendulum-station bservation was 430 rubles and that of the gravitational variometer station 5 rubles.--W. Ayvazoglou.

## 2. MAGNETIC METHODS

### (2205) DIE BERECHNUNG DER VERTIKALEN KOMPONENTE DES MAGNETFELDES IN DER NÄHE EINES VERTIKALEN MAGNETISCHEN DIPOLS, DER AUF DER GRENZFLÄCHE ZWEIER VERSCHIEDENER MEDIEN LIEGT

(CALCULATION OF THE VERTICAL COMPONENT OF A MAGNET FIELD NEAR A VERTICAL MAGNETIC DIPOLE WHICH LIES ON THE BORDER SURFACE OF TWO DIFFERENT MEDIA)

By W. Nunier

Annalen der Physik, Leipzig, vol. 20, no. 5, 1934, pp. 513-28

In the first part the author calculates a general formula for the magetic vertical component lying on the dipole axis for small distances beween the points, first in a conducting half space and then in the air space. hen the general formula is simplified, especially its imaginary part from which the 90° component is obtained; formulas are derived for both the media, and their agreement on the surface of separation is shown and discussed numerically.

In the second part the author calculates the magnetic vertical component near the surface of the earth, for small radial distances from the dipole; they agree with each other in both the media, as well as with the formula of the first part for $r = 0$ and $z \rightarrow 0$.--Author's abstract, translated by W. Ayvazoglou.

## (2206) MAGNETIC DECLINATION IN THE CARPATHIAN MOUNTAINS OF SKOLE AND THEIR FORELAND ACCORDING TO THE MEASUREMENTS MADE IN 1929 AND 1930 (in Polish)

By Edward Stenz

Institut de Géophysique et de Météorologie de l'Universite de Lwow, vol. 6, Communication 70, 1933, pp. 120-69

The author describes the magnetic survey in the oil-bearing region of the Carpathians of Skole and their foreland. An area of about 5,600 square kilometers was covered. Measurements of inclination were made at 308 stations, of the horizontal component at 138 stations, and of the magnetic declination at 65 stations.

Contents:

1. Field magnetometer used (Brunner-Chasselone No. 105)
2. Comparison with the measurements of declination in Cracow.
3. Measurements of magnetic declinations at the Daszawa magnetic station.
4. Registration of the changes in magnetic declinations in Daszawa.
5. Diurnal course of magnetic declination in Daszawa.
6. Mean annual values of declination at Daszawa for the years 1929 and 1930.
7. Secular variations of magnetic declination in the Lower Carpathians. Measurements in Stanislawow.
8. Measurements of magnetic declination in the field.
9. Working out of measurements and their accuracy.
10. Results of magnetic measurements (explained on a table).

11. Map of magnetic declinations in the Lower Carpathians.

12. Anomalies of the magnetic declinations in the Lower Carpathians.

rom the map of the anomalies of declination the author draws the conclusion hat the region of the Carpathians investigated is surrounded by weak positive nomalies and that the isonomalies have a course almost parallel to the bor-er of the Carpathians. Stronger anomaly was observed near Zydaczow-Chodorow. -W. Ayvazoglou.

### (2207) GEOTEKTONIK UND GEOMAGNETISMUS

### (GEOTECTONIC AND GEOMAGNETISM)

By N. N. Trubjatschinski

Reprint from the "Verhandlungen der siebenten Tagung des baltischen geodätischen Kommissions, April 1934, 19 pp.

The question is discussed under the following items:

1. Secular variations and Fisk's isoporic charts (charts showing lines of equal annual change). Five Fisk's isoporic charts are reproduced and compared with each other.

2. General conclusions drawn from all 5 isoporic charts.

3. Isogons and geosynclines.

From the results of the discussion the author is convinced that the com-arison of the charts shows definitely a conformity between the regional nomalies and the Alpine movement, and therefore the author believes that he most important anomalies of the geomagnetic field must be considered as esulting from the tectonic and chemical force working in the region of the agnetic zone of the continent.--W. Ayvazoglou.

### (2208) USE OF MAGNETIC DATA IN MICHIGAN IRON RANGES

By C. O. Swanson

Bulletin of the Michigan College of Mining and Technology, vol. 8, no. 1, 1934, pp. 1-22

This bulletin contains two papers: 1, A Magnetic Gradiometer, by Irwin oman and Thomas C. Sermon, published by the Am. Inst. of Min. and Metal. ng., as Tech. Pub. 542 (see Geophys. Abs. 60, p. 1108); and 2, Use of Mag-etic Data in Michigan Iron Ranges, by C. O. Swanson, which is a reprint from rans. Am. Inst. Min. Eng., vol. 110, 1934, Geophysical Prospecting.

In this second paper the author presents his experience with magnetic data in this region, based on his work during a period of 10 years. The viewpoints expressed are purely geological ones. Author's brief summary of the conclusion reads as follows:

The most important step is that of collecting the magnetic data. This requires a suitable adjustment of the dip needle, and enough readings to accurately portray the variations in the magnetic field, which are apt to be irregular. Once the readings are taken and plotted in some clear fashion, their interpretation is usually a matter of observing their relationship to the geologic data. In other words, one uses empirical relationships established separately for each area. The paper is divided into three sections: (1) Outline of the general practice; (2) comments on the practice; (3) examples of the practice. Ten figures complete the article.--W. Ayvazoglou.

## 3. SEISMIC METHODS

### (2209) SHEAR WAVES THROUGH THE EARTH'S CORE

By L. Bastings

The Dominion, May 16, 1934, 1 p.

Bastings makes deductions relating to the nature of the earth's core as a result of investigations in New Zealand. The types of earthquake waves which spread out to great distances from a major disturbance, are reviewed. According to the author, who investigated the material provided by some fifty European seismological stations from the 1929 earthquake in the Buller district of New Zealand, there was abundant evidence that shear waves penetrated the core and appeared on the far side. From the facts presented Bastings concluded that the earth's core transmitted shear waves like a solid, and did not damp them out after the manner of a liquid.--W. Ayvazoglou.

### (2210) OUTFIT FOR SEISMIC REFLECTION SHOOTING USED IN GEOPHYSICAL PROSPECTING

Editorial note

Oil and Gas Journal, Tulsa, vol. 33, no. 17, 1934, p. 44

The principle of the new recently developed, seismic reflection equipment for geophysical prospecting is described. It consists mainly of two separate units; the recording truck and the firing car. The recording truck contains the seismometers or pick-ups (ordinarily six) the amplifiers and batteries, wire reels, the camera as well as field telephone and various other accessories. The firing car contains explosives, firing box, double reel and telephone for communication with the recording truck. A drilling truck and water tank car are ordinarily added. The pick-ups are of the electro-magnetic type. Special amplifiers are developed for obtaining faithful reproduction of the ground movements. The weight of the equipment is split up so the equipment can be carried conveniently by porters or on horseback in inaccessible areas.--W. Ayvazoglou.

## (2211) REFLECTION-METHOD GEOPHYSICAL PROSPECTING EQUIPMENT

(American Askania Corporation and Heiland Research Corporation)

Editorial note

Instruments, Pittsburgh, vol. 7, no. 8, 1934, p. 196

The equipment announced in this article consists of (a) 6 pick-ups, 6 reels, 6 amplifiers (in 2 boxes), 2 battery boxes and a photographic recorder with 6 galvanometers, shot instant transmission and timing system; (b) accessories such as field telephones and duplex wire reels, firing box, developing outfit, etc.; (c) supplies such as electric lamps, batteries, 00-foot rolls of photographic paper, etc.; (d) spare parts in number depending on projected expeditions. (See also the previous article.)--W. Ayvazoglou.

## (2212) ON THE PROPAGATION OF TREMORS OVER PLANE SURFACE OF AN ELASTIC SOLID PRODUCED BY AN INTERNAL SOURCE

By Takuzo Sakai

Geophysical Magazine, Tokyo, vol. 8, no. 1, 1934, pp. 1-71

First the author briefly describes the problem of reflection of plane waves at the face surface to facilitate the investigations. Then he studies the roots of an irrational equation which plays an important role in the theory from a general point of view. Three kinds of sources which admit a simpler interpretation are assumed: (1) Case of a dilatational source; (2) case of a distortional source the displacement lying in the incident plane; (3) case of a distortional source the displacement being normal to the incident plane.--W. Ayvazoglou.

## (2213) ANALYSIS OF STRONG MOTION SEISMOGRAPH RECORDS OF THE WESTERN NEVADA EARTHQUAKE OF JANUARY 30, 1934, WITH DESCRIPTION OF A METHOD OF ANALYZING SEISMOGRAMS BY PRECISE INTEGRATION

By Frank Neumann

Coast and Geodetic Survey, U. S. Department of Commerce, Washington,
Strong Motion Report no. 4, September 1934, 22 pp.

Contents:

Descriptive notes.

Seismogram analyses (Bishop, San Jose)

A method of analyzing seismograms by precise integration:

(1) Mathematical theory; (2) abstract of steps required; (3) general remarks; (4) detailed description of method; (5) auxiliary table; (6) determination of constants; (7) adding machine slips required.

Plates: (1) Bishop accelerogram and computed displacement curves; (2) Bishop computed velocity curve; (3) San Jose accelerogram.--W. Ayvazoglou.

## (2214) A NOTE ON THE ELASTIC PROPERTIES OF ROCKS

By Roy W. Goranson

Journal of the Washington Academy of Sciences, Menasha, vol. 24, no. 10, 1934, pp. 419-28

The possibility of evaluation of the physical and chemical constitution of rocks from seismologic data if the density is known is discussed. The elastic properties determined within the earth are compared with the known properties of rocks determined from laboratory measurements under the simplified assumption that rock specimens are representative of the rock body from which they were removed, that elastic data are independent of the method employed, and that the functional relations are well-known enough so that laboratory data can be safely extrapolated beyond the experimental pressure limit.--W. Ayvazoglou.

## (2215) APPARATUS FOR THE MEASUREMENT OF TECHNICAL VIBRATIONS AND SEISMOGRAPHS ON THE PIEZO-ELECTRICAL PRINCIPLE

By Richard Ambronn

Circular issued from Göttingen, 1933, 4 pp., 5 fig.

From a note published in Publications of the Dominion Observatory, Ottawa, Canada, vol. 12, Bibliography of Seismology, no. 2, April, May, June, 1934, were as follows:

This circular is most satisfactory in that it gives a really good description of the apparatus and lists various combinations of equipment giving the prices of the individual items and those for the combinations. If the claims of the manufacturer are valid, the equipment described would be most convenient to handle in field operation. The cost of the most sensitive instruments for six seismographs simultaneously recording on the same drum, including packing, totals RM 13700. These give a magnification up to about 3 or 4 millions at 100 cycles. The circular gives a bibliography indicating reports of investigations made by the help of this apparatus.

## (2216) SUITABILITY OF MATERIALS FOR PHOTOELASTIC INVESTIGATIONS

By R. B. Carleton

Review of Scientific Instruments, Lancaster, vol. 5, no. 1, 1934, pp. 30-2

Glass, celluloid, cellulose acetate, hard and soft rubber, and seven ynthetic resins have been tested to determine their suitability for photo- lastic investigations. The stress-strain relations, photoelastic coefficients nd annealing temperatures have been measured. It is concluded that the syn- hetic resins phenobite, bakelite, and l'orca are among the most satisfactory aterials for photoelastic purposes.--Author's abstract.

## (2217) SEISMIC REFLECTION METHODS AND THEIR APPLICATION FOR EXPLORATION OF OIL DEPOSITS IN AMERICA (in Polish)

By Zygmunt Mitera

Karpacki Instytut Geologiczno-Naftowy, Boryslaw, no. 2, 1934, pp. 8-19

At the beginning of this article the author discusses the principles of ll geophysical methods of prospecting. The gravitational and magnetic methods o not have an important characteristic, called the depth control, in the same egree as the electric and seismic methods. This shows the importance of the ast-mentioned methods for practical geology and especially that of seismic ethods for oil geology. The seismic methods give not only fair accurate epth determination but allow us to outline the underground structures. eismic reflection methods are specially adapted to detail underground struc- ures, sometimes at depths of several thousand meters.

The fundamental principles of seismic methods are presented. They may e divided into two parts, refraction methods and reflection methods. An xample is given of an application of refraction method to outline a salt dome n Texas. The depth determinations of the refraction methods are limited and sually do not exceed 800 meters.

The reflection methods permit obtaining good reflections from depths as hallow as 150 meters and in Texas and California at a depth of about 6,000 eters. The average depth at which reflections are obtained is about 1,500 eters. It corresponds to the average depth of drilling.

The results of seismic reflection surveys in the United States and Canada re given and their economic importance for the increase of oil production in hese countries.

At the end the author discusses the possibilities of an application of he seismic reflection method to investigate the unknown oil reserves in the olish Carpathian foreland.--Author's abstract.

## (2218) SEISMOLOGY OF NEW ZEALAND

By C. E. Adams and J. Henderson

Dominion Observatory, Kelburn, Wellington, New Zealand,
Bulletin 80, 1931, 8 pp.

The article deals with earthquakes in New Zealand. The origins of the New Zealand seismic region are arranged by the authors in 5 groups. Seasonal and diurnal variation in earthquake frequency is shown by tables and graphs.—W. Ayvazoglou.

## (2219) EARTHQUAKES IN NEW ZEALAND

By C. E. Adams and J. Henderson

Dominion Observatory, Kelburn, Wellington, New Zealand,
Bulletin 81, 1931, 8 pp.

The numbers of earthquakes felt in New Zealand for each month during the years 1921 to 1930, inclusive, and the diurnal distribution of 158 of the most notable shocks felt during the same period of time are given in tables. The disastrous earthquake in Hawke's Bay on February 3, 1931, is mentioned.—W. Ayvazoglou.

## (2220) SEISMOLOGY IN NEW ZEALAND

By C. E. Adams and J. Henderson

Dominion Observatory, Kelburn, Wellington, New Zealand,
Bulletin 84, 1932, 8 pp.

Some data on the Hawke's Bay earthquake of February 3, 1931, are given. Summary of most notable earthquakes felt in New Zealand in 1931 is presented in a table.—W. Ayvazoglou.

## (2221) SEISMOLOGICAL REPORT OF THE HAWKE'S BAY EARTHQUAKE OF 3D FEBRUARY, 1931

By C. E. Adams, M. A. F. Barnett, and R. C. Hayes

Dominion Observatory, Wellington, W. 1, New Zealand,
Bulletin 85, 1933, 16 pp.

The article is divided into two parts. In part 1, General Introduction, the authors discuss: (1) Relation of New Zealand seismology to that of the Pacific; (2) general seismology of New Zealand; (3) past seismic activity in Hawke's Bay region; (4) foreshocks. Part 2, The Earthquake, deals with: (1) The distribution of seismic intensity; (2) the seismograph records; (3) the horizontal motion of the ground; (4) the determination of the epicentre, time and origin, and focal depth; (5) the aftershocks.—W. Ayvazoglou.

## (2222) SOME SEISMOLOGICAL ASPECTS OF THE BULLER EARTHQUAKE, 1929, JUNE 16-17

By L. Bastings

Dominion Observatory, Wellington, New Zealand, Bulletin 86,
1933, 15 pp.

Items of the article: (1) Magnitude of the earthquake; (2) the seis-ological evidence for origin and time of occurrence; (3) depth of focus; 4) the nature of the local movements; (5) energy of the uplift; (6) the eismological material; (7) a theory of three foci; (8) a revised time at the rigin; (9) travel-time values.--W. Ayvazoglou.

## (2223) SEISMOLOGY IN NEW ZEALAND

By C. E. Adams

Dominion Observatory, Wellington, W. 1, New Zealand, Bulletin 87,
1933, 4 pp.

Most notable earthquakes felt in New Zealand in 1932 are summarized in table. The total number of seismological stations in New Zealand is rought up to 13. Complete reports on data regarding the principal earth-akes are published from time to time.--W. Ayvazoglou.

## 4. ELECTRICAL METHODS

## (2224) FORTSCHRITTE DER ELEKTRISCHEN METHODEN ZUR LEITFÄHIGKEITSBESTIMMUNG IN GROSSEN TIEFEN BEI AUFSUCHUNG VON ERDÖL

(PROGRESS IN ELECTRICAL METHODS FOR DETERMINING THE CONDUCTIVITY AT GREAT DEPTHS IN PROSPECTING FOR OIL)

By J. G. Koenigsberger

Petroleum Zeitschrift, Berlin, vol. 30, no. 31, 1934, pp. 5-6

Two methods are developed. The first consists of obtaining a great umber of data by varying the distances between the electrodes; based on ese results the conductivities of various layers may be calculated. This ethod is applicable when the extension of the layers is at least twice as reat as their depth; a small angle of incidence of the layers is required esides. In the second method the points of measurements are displaced; his method allows determining, in the first place, the borders of the ayers, regardless of the angle of incidence. The extension of the layers ay be determined besides. By using the present time methods oil-bearing eposits can be investigated down to 2 or 3 kilometers of depth.--W. Ayvazoglou.

## (2225) EQUIPOTENTIAL SURVEY AT ALICE, COLO.

By Sylvain J. Pirson

The Mining Magazine, Denver, vol. 24, no. 10, 1934, pp. 9, 10, and 20

This survey was carried out to demonstrate the possibility of self-potential work on the disseminated sulphide deposit at Alice, Colo. Two types of geophysical surveys were used mainly:

1, The spontaneous polarization method; and 2, the alternating-current equipotential line method. From the results of the survey the author draws the following conclusions

> 1. The spontaneous polarization method is applicable to very disseminated deposits of ore readily oxidizable (pyrite, chalcopyrite) and where part of the deposits emerges from the water table, thus giving rise to two regions in the orebody, mainly the oxidized zone or gossan and the reducing zone. The orebody acts then as a large battery and can be determined by measurement of potential distribution on the surface. 2. In case of disseminated deposits, the A.C. equipotential line method of prospecting cannot be expected to be of great value.--W. Ayvazoglou.

## (2226) ELECTRICAL PROFILES IN GAPS IN NEW JERSEY TRAP RIDGES

By M. King Hubbert

American Journal of Science, New Haven, vol. 28, no. 163,
1934, pp. 65-70

In a map of part of Passaic Quadrangle the author shows the location of gaps in trap ridges and of the earth-resistivity profiles. The present work was undertaken in the spring of 1932. Earth-resistivity profilee were run in three of the six gaps. The apparatus used was the megger ground tester. The field technique employed was the four-electrode method devised by Wenner and applied by Gish and Rooney. The electrode spacing was kept constant at 40 meters, and stations were occupied along the line of traverse at 40-meter intervals. Graphs of the resistivity profiles and diagrams showing the approximate relations between the position of the topographic crest line of a trap ridge and of the resistivity maximum of the same rock in a gap are given. The following conclusion is drawn by the author:

> In all of these profiles the occurrence of the maxima were approximately as would be expected on the hypothesis that the trap were present under the glacial drift in each case and seems, therefore, to indicate the presence of the trap. The decline in the magnitude of the maxima in the succeeding gaps is apparently due to a progressively increasing depth of burial of the trap in each instance. This accords with Johnson's interpretation (Johnson, Douglas, Stream Sculpture on the Atlantic Slope,

Columbia University Press, 1931, pp. 90-131) that the gaps were carved by the Hudson River when flowing southwestward across the trap streets, so as to give gaps progressively deeper downstream. The apparatus used was not of the kind to provide reliable depth determinations.--W. Ayvazoglou.

### (2227) RESULTS OF APPLICATION OF THE INDUCTION METHOD AND THE METHOD OF NATURAL CURRENTS MEASUREMENT TO THE PROSPECTING FOR SULPHIDE-ORE DEPOSITS IN KARELIA, IN 1932-33 (in Russian).

By S. Liogenky

Bulletin of the Leningrad Geological, Hydrogeological, and Geodetic Trust, no. 2, 1934, pp. 22-30

The aim of this work was to contour the orebodies belonging to the uezero mine in Karelia as well as to detect new orebodies. The region of e Shuezero mine is represented by diabases, quartzites, and metamorphic eenschists.

Two anomalies were found within the area of the mine by the natural rrents method. The first had two negative maximums which, after being ecked by the mining works, proved to be caused by two quartz-calcite lodes. e first consisted of copper and molybdenum sulphide and the second of pper sulphides exclusively. The second anomaly was also checked by a rehole and its relationship with an insignificant quartz-calcite lode closing chalcopyrite, and galena was confirmed. The anomalies obtained the method of natural currents measurement were not revealed by the induction method, probably owing to the small dimensions of the bodies by which e anomalies were caused.--W. Ayvazoglou.

### (2228) GEOPHYSICAL PROSPECTING - A STUDY OF THE RESISTIVITY METHOD IN CONNECTION WITH THE INVESTIGATION OF UNDERGROUND-WATER SUPPLIES IN THE NATA RESERVE, SOUTHERN RHODESIA

By S. H. Shaw

Bulletin of the Institution of Mining and Metallurgy, London, no. 361, October 11, 1934, 27 pp.

This paper gives an account of the application of the resistivity thod of geophysical prospecting to certain water-supply problems in uthern Rhodesia and of the results of subsequent boreholes put down to eck the electrical work.

The object of the tests, made during July and August, 1933, was to see ether geoelectrical methods would be of assistance in the selection of illing sites for the development of water supplies.

The tests were carried out over an area of about 100 square miles in e northeastern part of the Nata Reserve.

A table showing the records of boreholes in the Nata Reserve completed before the resistivity tests is given. From the examination of these records the water-bearing rocks are grouped by the author into three categories:

1. Sediments, usually sandstone, directly overlying granite.

2. Sandstones, underlying the Karroo basalt-flows.

3. Sediments, usually sandstones, whose position in relation either to basalt or to granite is unproved in the holes.

A brief outline of the principle and practice of the resistivity method is given. The instruments used were the potentiometer-ammeter apparatus and the megger earth tester. Both instruments were found to work satisfactorily under the conditions in Rhodesia and good agreement was obtained between megger and potentiometer readings of resistivity.

The results of field tests at completed holes and at new sites in the Nata Reserve are discussed and illustrated by a series of resistivity curves.

The check drilling confirmed the indications from the resistivity measurements in a very satisfactory way. The author concludes:

> One important point must always be borne in mind. In spite of its successful application to water-supply problems the resistivity method does not locate water directly as such. It is true that the resistivity of a large rock is largely determined by the amount and salinity of the water it contains; but, although saturated and of low resistivity, a rock may not yield its water in a well or borehole, or if it does so the water may be unsuitable for use. The success of the method, then, rests upon two things; the determination by electrical measurements of the presence of a formation of suitably low resistivity, and the geological interpretation by which that formation may reasonably be supposed to carry and yield water of suitable quality. The geophysical work must be accompanied and checked by geological observation.

(Extra copies of this paper may be obtained at 1s. 9 d. each at the Office of the Institution of Mining and Metallurgy, Cleveland House, 225, City Road, London, E.C. 1).--W. Ayvazoglou.

### (2229) ON THE FLOW OF ELECTRIC CURRENT IN SEMI-INFINITE MEDIA IN WHICH THE SPECIFIC RESISTANCE IS A FUNCTION OF THE DEPTH

By Louis V. King

Philosophical Transactions of the Royal Society of London,
series A, vol. 233, pp. 327-59

In a previous paper (On the Flow of Electric Current in Semi-infinite Stratified Media, Geophys. Abs. 57, p. 1014) the writer has dealt with the low of electric current from a point-electrode at the surface flowing into stratified medium, each layer of which is of constant specific resistance. n the present paper a general method is developed for determining the dis- ribution of surface potential when the specific resistance is a continuous nction of the depth. When this problem has been solved the surface- tential distribution for any arrangement of discrete or continuously dis- ributed electrodes, which it may be convenient to use in geophysical pros- cting by this method, may be obtained by addition or by integration if con- inuous line-electrodes are employed. A mathematical discussion is given nder the following sections: (1) Introduction; (2) determination of $\psi$ for dium of varying conductivity bounded by insulating plant at z = h; (3) de- rmination of $\psi$ for medium of varying conductivity bounded by a perfectly nducting plane at z = h; (4) determination of $\Psi$ for medium of varying con- ctivity of infinite depth; (5) special solutions for $\psi$ by the use of known nversion formulas (examples); (6) resistance gradients, $\rho/\rho_s = (1+\frac{z}{a})^m$ $0 < a < \infty, -\infty < m < +\infty$ (7) discussion of particular cases of re- stance gradient $\rho/\rho_s = (1+\frac{z}{a})^m$ (examples); (8) direct determina- on of the potential $V$ (examples); (9) geophysical applications, determina- on of gradient of resistance from surface-gradient characteristic; (10) de- rmination of surface potential for line electrodes; (11 note on the de- rmination of the depth constants; (12) summary and conclusions.-- Ayvazoglou.

## (2230) ON THE ACOUSTIC RADIATION FIELD OF THE PIEZOELECTRIC OSCILLATOR AND THE EFFECT OF VISCOSITY ON TRANSMISSION - PARTS I AND II

By L. V. King

Canadian Journal of Research, Ottawa, vol. 11, nos. 2 and 4, 1934,
pp. 135-55 and 484-8

Author's abstracts read as follows:

Part I: The radiation field due to a circular disk oscillating with niform amplitude in a closely fitting circular aperture surrounded by an nfinite rigid flange has been studied in detail, the velocity potential eing expressed as an infinite integral involving cylindrical coordinates. he procedure adopted may be used to study the effect of viscosity on the haracteristics of the radiation field. While having little effect on the ield in the neighborhood of an oscillator generating waves in water, the iscosity has a marked effect on the range of distant transmission, which n consequence is appreciably affected by temperature. Of considerable ractical importance is the existence of an optimum wave length for constant utput and a given distance of transmission. By means of a simple chart, it s possible to determine the optimum wave length for a given transmitter hen the level of reception for a given range is stated.

Part II. Numerical data on the distance of transmission of sound in sea ater from a 10-inch piezoelectric oscillator are discussed in the light of heoretical results obtained in a previous paper. It is shown how by the principle of similitude the chart of transmission at optimum wave-length calculated for a 50-watt, 60 centimeter oscillator can be used for a transmitter of any given diameter and output. A comparison with some experiments of Boyle's points to the fact that at supersonic frequencies, in the neighborhood of 100,000 cycles, a considerably higher coefficient of viscosity than that obtained by flow methods must be used.

## 5. RADIOACTIVE METHODS

### (2231) AUTO RADIO - AN AID IN GEOLOGIC MAPPING

By Ernst Cloos

American Journal of Science, New Haven, vol. 28, no. 106, 1934,
pp. 255-68

Recent experiments have proved that the quality of wireless reception from certain stations is influenced by geologic conditions of the underground. Structural disturbances such as faults or steeply dipping rock contacts cause "dead spots". A radio survey of such localities gives valuable indications for determining geologic structure on the one hand and for guiding the installation of radio sets and transmitting stations on the other. A small alteration in an ordinary automobile radio set is enough for determining such disturbances quantitatively and qualitatively.

Contents: (1) Introduction; (2) equipment; (3) method; (4) the phenomena; (5) interpretation of phenomena; (6) results (the fault at Riderwood, rock boundaries, the dip angle, observations in Wyoming, failures); (7) literature. --Author's abstract.

## 6. GEOTHERMAL METHODS

### (2232) TEMPERATURE GRADIENTS

By C. E. van Orstrand

Problems of Petroleum Geology, American Association of Petroleum Geologists, August 1934, pp. 989-1021

The first part of this paper consists of a brief discussion of the correlation of temperature with structure and the possible causes of temperature variations over local and regional areas.

The second part of the paper consists of a table in which are summarized certain constants deduced from the temperature records of 679 wells in 23 States.--Author's abstract.

## 7. UNCLASSIFIED METHODS

### (2233) WORK OF GEOPHYSICAL PROSPECTING EXPERIENCING RAPID GROWTH

Editorial note

Oil and Gas Journal, Tulsa, vol. 33, no. 16, 1934, p. 68

In this note the Oil and Gas Journal answers the question addressed to ne journal on the amount of geophysical work being done now by oil companies, specially those operating in the Mid-Continent region. According to this ote the search for buried structures favorable for the recovery of oil or as is growing constantly. It is estimated that about 60 parties were in the ield recently, distributed as follows: Texas and Louisiana 26, Oklahoma 18, ansas 12, Colorado 1, Nebraska 1, and California 2. Several parties are enaged in geophysical work in Pennsylvania and Michigan. According to the esimation of an executive of one of the oil companies operating extensively in ne Mid-Continent area, about 7 million dollars was spent in 1933 for geoysical field parties in Texas, Oklahoma, and Kansas alone. About $1,500,000 as spent for seismographic work in Oklahoma and Kansas and $5,500,000 for eophysical work of all kinds, including seismograph, in Texas.--W. Ayvazoglou.

### (2234) GEOPHYSICS ON THE WITWATERSRAND

Editorial note

South African Mining and Engineering Journal, Johannesburg,
vol. 45, no. 2177, 1934, p. 285

The author of this note discusses Oscar Weiss' paper, The Application nd Limitations of Geophysical Prospecting Methods in the Witwatersrand Area, ead by Weiss before a joint meeting of the Chemical, Metallurgical, and ining Society and the Geological Society on April 25, 1934. (See Geophys. bstract 64, p. 1207.)--W. Ayvazoglou.

## 9. NEW BOOKS

2235) Corlin, Axel, Cosmic Ultraradiation in Northern Sweden, 113 pp. of text, 80 pages of tables, and bibliography, 1934. A study is made of the relation between the radiation measured, and the air pressure, air temperature and humidity, using the method of multiple correlation.

2236) Transactions American Institute of Mining and Metallurgical Engineers, vol. 110, 1934, New York, Geophysical Prospecting, 1934. Published by the institute at the office of the secretary, 29 West 39th Street. This volume is the third of a series devoted to papers and discussions on Geophysical Prospecting. The three volumes are as follows: 1929 Geophysical Prospecting, vol. 81; 1932, vol. 97; and 1934, vol. 110. The last volume contains papers and discussions presented at the New York meetings in February, 1932, 1933, and 1934. Contents:

Electrical Methods: (1) Results of Earth-resistivity Survey on Various Geologic Structures in Illinois, by M. King Hubbert; (2) Location of Faults in Hardin County, Ill., by the Earth-Resistivity Method, By M. King Hubbert and J. Marvin Weller; (3) Some Practical Applications of Resistivity Measurements to Highway Problems, by Karl S. Kurtenacker; (4) Location and Study of Pipe-Line Corrosion by Surface Electrical Measurements (abstract), by C. and M. Schlumberger and E. G. Leonardon; (5) Electrical Methods in Prospecting for Gold, by Folke H. Kihlstedt; (6) Discoovering Gold-Quartz Veins Electrically (abstract), by S. F. Kelly, Theodor Zuschlag, and Bela Low; (7) Application of Resistivity Methods to Northern Ontario Lignite Deposits, by R. H. Hawkins; (8) Geophysical Studies in Placer and Water-Supply Problems (abstract), by J. J. Jakosky and C. H. Wilson; (9) Electrical Exploration of Water-Covered Areas, by C. and M. Schlumberger and E. G. Leonardon; (10) Interpretation of Resistivity Measurements, by G. F. Tagg; (11) Interpretation of Three-Layer Resistivity Curves, by Sylvain J. Pirson; (12) Some Observations Concerning Electrical Measurements in Anisotropic Media and Their Interpretation, by C. and M. Schlumberger and E. G. Leonardon; (13) Some Interpretation of Earth-Resistivity Data, by Irwin Roman; (14) A Contribution to the Theory of the Interpretation of Resistivity Measurements obtained from Surface Potential Observation, by R. J. Watson; (15) Electrical Coring; A Method of Determining Bottom-Hole Data by Electrical Measurements, by C. and M. Schlumberger & E. G. Leonardon; (16) A New Contribution to Subsurface Studies by Means of Electrical Measurements in Drill Holes, by C. and M. Schlumberger and E. G. Leonardon.

Magnetic Methods: (1) Use of Magnetic Data on Michigan Iron Ranges, by C. O. Swanson; (2) Magnetic Measurements on Auriferous Veins in Brazil, by Mark C. Malamphy; (3) An Accurate Simplified Magnetometer Field Method, by Hubert O. De Beck; (4) Theory and Experiments Concerning A New Compensated Magnetometer System, by C. A. Heiland and W. E. Pugh; (5) A Magnetic Gradiometer, by Irwin Roman and Thomas C. Sermon.

Seismic Methods: (1) Reflection Method in Seismic Prospecting, by H. M. Rutherford; (2) Certain Instrument Problems in Reflection Seismology, by C. A. Heiland; (3) Certain Field Problems in Reflection Seismology, by W. E. Pugh; (4) Seismic Refraction Methods as Applied to Shallow Overburdens, by F. L. Partlo and Jerry H. Service; (5) Analysis of Seismic Profiles, by Irwin Roman.

General: (1) Recent Geothermal Measurements in the Michigan Copper District, by James Fisher, L. R. Ingersoll, and Harry Vivian; (2) Geophysics in the Nonmetallic Field, by C. A. Heiland.

(2237) Machatschek, Prof. Dr. Fritz, Geomorphologie (Geomorphology), 2d ed. 1934, 154 pp., issued by B. G. Teubner, Leipzig and Berlin; price 4.50 gold marks. The first four chapters are of a general nature and deal with the physical and chemical forces that can be regarded as active agents in the modification of the earth's crust. The remainder of the book is devoted to a critical analysis of land forms under varying climatic and structural conditions. The book contains a most useful appendix in which about 100 terms of foreign origin are defined.

(2238) Marsden, E. Eighth Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1934, 73 pp. A brief outline of geophysical work carried out by the Department is given on p. 4. Geophysical methods have been applied to a variety of problems. Old river beds have been traced across the Cromwell Flat and at Cornish Point. The geophysical findings proved to be useful. Work was also carried out in connection with contouring the basement rock and quartz conglomerates on several areas in the Manuhezikia Valley. Series of measurements were made in connection with an ancient buried river-bed in the Waikaia area. Work is in progress in various other regions and many applications for work are under consideration.

## 10. PATENTS

### (2239) GRAVITY INDICATOR

Alexander McLean Nicolson, New York, N. Y.,
assignor to Communication Patents, Inc., New York, N. Y.,
a corporation of Delaware

United States Patent 1975516 Issued Oct. 2, 1934.

This invention relates to an apparatus for determining the value of gravity at any point comprising an oscillating circuit, a piezoelectric crystal located in said circuit for determining the frequency thereof, and means for adjusting said crystal in different planes with respect to a plane passing through the center of the earth, the difference in frequency of oscillations at said different positions indicating the value of gravity at said point.

Claims allowed - 10.

### (2240) MAGNETIC BALANCE FOR THE MEASUREMENT OF INTENSITIES

Erwin Roux, Berlin-Friedenau, Germany, assignor to Askania
Werke A. G., Vormals Central-Werkstatt Dessau und Carl
Bamberg-Friedenau, a Germany company

United States Patent 1976636 Issued Oct. 9, 1934

This invention relates to a magnetic balance comprising a casing, a balance body pivoted therein and provided with a mirror, and a telescope for observing the oscillations and the position of equilibrium of said balance body, said telescope comprising a tube, said tube being set into casing with its optical axis vertical and directed upon the mirror of the balance body, the tube containing transparent material having a scale thereon, arranged in the focal plane of the telescope objective, an eyepiece consisting of two collecting lenses, a plane-parallel glass plate arranged between the collecting lenses and inclined at an angle of 45° to the optical axis, there being an opening in the mounting of the eyepiece, laterally of the plane-parallel glass plate, and a lateral opening between the objective and the glass scale in the wall of the tube, a shaft rotatably supported in the tube opposite the opening, a mirror secured to the shaft within the tube, and means for turning the shaft into two positions, in one of which the mirror clears the path of light from the objective to the eyepiece and in the other of which the objective deflects rays passing therethrough through an angle of 90° and through the lateral opening.

Claims allowed - 12.

### (2241) METHOD OF DETERMINING GEOLOGICAL STRUCTURE

Kenneth E. Burg, Stafford, Kans., assignor to Geophysical Service, Inc., a corporation of New Jersey

United States Patent 1978668 Issued Oct. 30, 1934

This invention relates to a method of generating seismic waves below the ground water level in the earth for the purpose of making subsurface geological explorations, said method characterized by causing a generator of seismic waves to be placed below the ground water level in the earth and causing said generator to operate in conjunction with seismic recording apparatus, receiving and recording said seismic waves and observing the results secured therefrom.

Claims allowed - 2.

### (2242) PERFECTIONNEMENT AUX METHODES DE PROSPECTION ELECTRIQUE DU SOUS-SOL

### (IMPROVEMENT IN THE ELECTRICAL METHODS FOR PROSPECTING)

Companie Générale de Géophysique, residing in France (Seine)

French Patent 766744 Issued July 3, 1934

This invention relates to the electrical method of prospecting in which the differences of the potential produced by the ground currents may be measured without the necessity of using arbitrary currents sent into the ground for this purpose by the operator. This is accomplished by measuring the differences of potential caused by the ground currents between the points on the surface of the ground united in pairs at a moment when these currents have a given direction; these differences of potential are compared with the differences of potential taken at the same moment between two fixed points.

Claims allowed - 4.

# (2243) PROCEDE ET APPAREILLAGE ELECTRIQUE POUR DIAGNOSTIQUER LA NATURE DES TERRAINS, EN PARTICULIER DES COUCHES PETROLIFERES ET AQUIFERES, RECOUPÉS PAR UN SONDAGE

## (ELECTRICAL METHOD AND APPARATUS FOR DETERMINING THE NATURE OF THE ROCKS, ESPECIALLY PETROLIFEROUS AND AQUATIC LAYERS, PENETRATED BY BORING)

Societe Prospection Electrique, Procedes Schlumberger,
residing in France (Seine)

rench Patent 762016 Issued Apr. 3, 1934

This invention relates to the electrical method for determining the ature of the rocks, especially petroliferous and aquatic layers, penetrated y boring and consists of producing residual potential in a borehole conaining liquid conducting body, of measuring this residual potential at arious points of the hole, and of determining in this way the nature of he layers at these various points.

Claims allowed - 5.

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